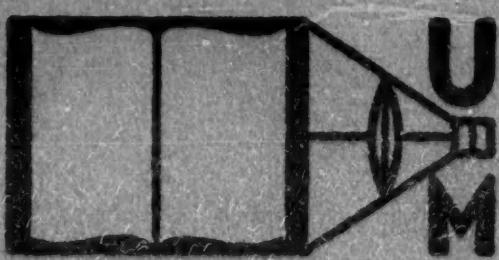


Vol. IX

No. 1

# MICROFILM ABSTRACTS

*A Collection of Abstracts of  
Doctoral Dissertations and Monographs  
Available in Complete Form  
on Microfilm*





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**UNIVERSITY MICROFILMS**  
**Ann Arbor, 1949**

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## INTRODUCTION

In the past this publication has been devoted exclusively to abstracts of doctoral dissertations, available in complete form as microfilm or paper enlargements. Volume VI Number 2 initiated a departure from this policy; the inclusion of abstracts of longer monographs of merit, in addition to dissertations.

The same conditions warranting microfilm publication of dissertations, namely size, expense of publishing through ordinary channels, delay in publication, and a limited but nonetheless important demand for copies, apply equally well to certain monographs of a specialized nature. Accordingly this and future issues will be divided into three sections instead of two, as in the past: 1) Abstracts of doctoral dissertations; 2) Abstracts of monographs (not dissertations); and, 3) A cumulative index of titles abstracted in preceding issues of Microfilm Abstracts.

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## INTRODUCTION

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Eugene B. Power

## CONTENTS

### PART I --- DISSERTATIONS

	<u>Page</u>
<b>AGRICULTURAL ENGINEERING</b>	
Principles Affecting the Performance of Mechanical Sugar Beet Planters -- Walter M. Carleton . . . . .	1
<b>ASTRONOMY</b>	
An Analysis of the Motions of the B Stars in Orion -- Harry M. Bendler . . . . .	3
<b>BACTERIOLOGY</b>	
<u>The Effect on Toxin Production and Growth of Passing and CO<sub>2</sub> Through Deep Broth Cultures of Corynebacterium Diphtheriae</u> -- Rafael Cordova-Marquez	5
The Influence of Bacteriophage, Antibiotics, and Eh on the Lactic Fermentation of Cucumbers -- Louis W. Faville . . . . .	7
<b>BOTANY</b>	
Morphological Studies in the Genus <u>Nocardia</u> -- Norvel M. McClung . . . . .	9
<b>CHEMISTRY</b>	
Cyclic Acetals -- Floyd E. Anderson . . . . .	11

	<u>Page</u>
<b>CHEMISTRY -- cont'd</b>	
Magnetic Susceptibility of Weakly Paramagnetic Substances -- Juan D. Curet-Cuevas . . . . .	14
Reactions of 2-Arylcyclohexanones -- Lawrence B. Wick	16
The Temperature Coefficient of the Ceric-Cerous Electrode -- Richard B. Saltonstall . . . . .	19
Fritz Ludwig Straus, 1877-1942 -- Henrich Hauptmann	20
Adsorption of Aliphatic Amine Vapors by Silica Gel -- Donald G. Dobay . . . . .	22
Thermodynamic Analysis of Non-Ideal Vapor-Liquid Equilibrium -- Harry H. Steinhauser, Jr. . . . .	24
Studies on 1-Vinylnaphthalene in the Diels-Alder Reaction -- Norman C. Deno . . . . .	27
<b>CHEMISTRY, PHYSICAL</b>	
Pressure Volume Temperature Relationships and Phase Equilibria in the System Ethylene-Normal Butane -- Brymer Williams . . . . .	29
<b>DRAMA, AMERICAN</b>	
The Living Newspaper: A Study of the Nature of the Form and Its Place in Modern Social Drama -- Marjorie L. P. Dycke . . . . .	30
<b>ECONOMICS</b>	
Consolidated Statements -- Lloyd F. Morrison . . .	33
<b>EDUCATION</b>	
Proposals for the Development of Education in India Derived from a Synthesis of Occidental and Oriental Sources -- Lalita Manibhai Desai . . . . .	35

## CONTENTS

vii

Page

## EDUCATION -- cont'd

	<u>Page</u>
A Study of Performance in Certain Physical Activities which Involve Persistence -- John K. Doherty . . . . .	38
The Legal Basis of the Social Studies in Michigan 1787-1948 -- Howard K. Holland . . . . .	41
A Study of the Educational Performance of Returned Veterans Admitted to College Through the Servicemen's Institute at Michigan State College -- Ross W. Matteson	43
A Comparative Study of Accident-Repeaters and Accident-Free Pupils -- Sidney B. Birnbach . . . . .	45
A Comparative Study of Personal Adjustment Problems of Brethren Young People in Summer Camps and Certain Non-Brethren Young People -- Abram S. Curry	53
An Evaluation of the Established Regulations Employed by the States to Ensure the Health and Safety of Varsity Competitors in Secondary Schools -- Charles G. De Shaw . . . . .	56
Institutional Integration in Collegiate Schools of Nursing -- Marguerite C. Holmes . . . . .	60
Camping Education: A Book Dealing with the Educational Aspects of Camping -- Frank L. Irwin . . . . .	63
A Handbook for Directors of High School Orchestras -- Albert A. Renna . . . . .	66
A Survey of the Social Studies Courses of Study in New York State Colleges and Universities -- Dorothy M. Torpey . . . . .	69
A Determination of the Principles and Experiments Desirable for a High-School Course of Integrated Physical Science -- Vaden W. Miles . . . . .	72
Moral Freedom and the Educative Process, A Study in the Educational Philosophy of William Torrey Harris -- John R. Arscott . . . . .	75

	<u>Page</u>
<b>EDUCATION -- cont'd</b>	
A Course in Sex Education and Marriage Preparation at the Higher-Education Level -- Forrest S. Hamilton . . . . .	79
An Analysis of Selected Guidance Activities With Recommendations For Housing Them in Large Public School Systems -- Joy B. Munson . . . . .	82
A Professional Curriculum in Health and Physical Education for the State Teachers College at New Haven, Connecticut -- Charles A. Bucher . . . . .	88
A Study of the Intelligence, Achievement, and Emotional Adjustment of Crippled Children in an Orthopedic Hospital School -- Anthony F. Donofrio . . . . .	92
A History of Gammon Theological Seminary -- Prince A. Taylor, Jr. . . . . .	95
An Experimental Study of Sampling Procedures for the Determination of Achievement Test Norms in a City School System -- Joseph W. Menge . . . . .	97
The Theory and Practice of Senior High School Administration in Twelve Cities of Michigan, Ohio, and Indiana -- Winston L. Roesch . . . . .	99
An Analysis of Selected Opinions on the Selection and Relationship of Members of State Boards of Education and Chief State School Officers -- Laiten L. Camien.	101
<b>EDUCATIONAL PSYCHOLOGY</b>	
An Investigation into the Personality of Normal Deaf Adolescent Girls -- Edna S. Levine . . . . .	103
<b>ENGINEERING</b>	
A Study of the Plastic Theory of Reinforced Concrete Beam Design and the Effect of Compression Steel in Reinforced Concrete Beam -- Adil Belgin . . . . .	106

## CONTENTS

ix

Page

## ENGINEERING -- cont'd

Heat Transfer and Pressure Drop for Superheated  
Steam Flowing in Plain and Modified Annuli --  
George W. Govier . . . . . 108

## FORESTS AND FORESTRY

The Application of Accounting Theory to the Field of  
Industrial Forest Management -- James G. Rowbury 111

A Regional Analysis and Plan of Integrated Manage-  
ment for the Cut-Over Uplands of Southwest Louisiana  
-- Harry M. Snyder . . . . . 113

## GEOGRAPHY

The Shu Tao or the Road to Szechuan: A Study of the  
Development and Significance of Shensi-Szechuan Road  
Communication in West China -- Herold J. Wiens . . 116

## HISTORY

Laissez Faire and the General-Welfare State in  
American Thought, 1865-1901 -- Sidney Fine . . . . 118

The Subsidization of Border Peoples as a Roman  
Policy in Imperial Defence -- Colin D. Gordon . . . 121

The Evolution of the Missouri Militia 1804-1919  
-- John G. Westover . . . . . 123

The Federal Volunteer Soldier in the American  
Civil War 1861-1865 -- Francis A. Lord. . . . . 125

## LANGUAGE, ENGLISH

A Word Atlas of the Great Lakes Region -- Alva  
L. Davis . . . . . 127

	<u>Page</u>
<b>LANGUAGE, ENGLISH -- cont'd</b>	
The Speech of New York City -- Yakira H. Frank .	129
The History of Inflectional <u>n</u> in English Verbs -- David W. Reed . . . . .	131
<b>LITERATURE, ENGLISH</b>	
The Significance of Ireland in the Work of W. B. Yeats -- Donald R. Pearce . . . . .	133
<b>LITERATURE, FRENCH</b>	
The Humanitarianism of François Coppée -- Ruth N. Horry . . . . .	135
<b>MATHEMATICS</b>	
Branch Points of Solutions of Equations in Banach Space -- Jane S. Cronin . . . . .	138
<b>MEDICINE</b>	
The Male Thoracic Index and Its Relationship to Pulmonary Tuberculosis -- Samuel T. Robbins . . .	141
<b>MINING, ENGINEERING</b>	
A History of Land Subsidence and Its Consequences Caused by the Mining of Anthracite Coal in Luzerne County, Pennsylvania -- Ellis W. Roberts . . . . .	145
<b>MUSIC</b>	
The Souterliedekens and Its Relation to Psalmody in the Netherlands -- Henry A. Bruinsma . . . . .	148

## CONTENTS

xi

### Page

#### PHYSICS

The Thermal Anomaly of the Alloy of 80% Ni and 20% Cr(Ni<sub>3</sub>Cr) -- John M. Hinkle . . . . . 150

#### POLITICAL SCIENCE

Presidential Succession -- Ruth C. Silva . . . . . 152

#### PSYCHOLOGY

The Relation of Personality Maladjustments of 503 University of Michigan Students to their Occupational Interests -- Don B. Feather . . . . . 154

The Relation of Set to Reasoning in the Maze -- Michael M. Gilbert . . . . . 156

Effects of Exposure to Sound on Discrimination Performance in the Rat -- Jane Shohl . . . . . 159

A Statistical Examination of Sheldon's Concept of Primary Components of Morphology -- Robert S. Waldrop . . . . . 161

The Relationship Between Personality and Efficiency in the Use of Prostheses by Amputees -- Sidney Levy 163

Changing Objectives in Psychological Treatment -- Joel Shor . . . . . 165

Indoctrination for Minority Group Membership and Its Relationship to Social Acceptability -- Max Rosenbaum . . . . . 168

#### PSYCHOLOGY, PATHOLOGICAL

The Psychological Effects of Prefrontal Leukotomy of Schizophrenics -- Earl E. Swartzlander . . . . . 171

	<u>Page</u>
<b>PUBLIC HEALTH</b>	
Selected Sanitary Personnel for Local Community Service -- Charles F. Shockey . . . . .	174
<b>SOCIAL SCIENCE</b>	
The Structure of the Metropolitan Community: A Study of Dominance and Subdominance -- Donald J. Bogue . . . . .	176
The Polish Peasant in Transition: A Study of Group Integration as a Function of Symbiosis and Common Definitions -- Peter A. Ostafin . . . . .	179
<b>SOCIOLOGY</b>	
Mortality Differentials in Michigan -- Paul M. Houser	182
The Construction of a Home Adjustment Questionnaire which may be Used as an Aid in the Detection of Symptoms of Juvenile Delinquency -- Mae B. Claytor	185
<b>THEATER, FRENCH</b>	
A Study of Elisabeth Rachel Felix (1821-1858) -- Arthur Klein . . . . .	188
<b>ZOOLOGY</b>	
A Contribution to the Life-History of the Deer Lung-worm <u>Leptostrongylus Alpenae</u> (Nematoda: Metastrengylidae), With Observations on Its Incidence and Biology -- E. Leonard Cheatum . . . . .	190
Cytological Studies on the Oogenesis of Certain Indian and American Snakes -- Brahma S. Kaushiva .	192

## CONTENTS

xiii



**PART I**

**DISSERTATIONS**

1868

# AGRICULTURAL ENGINEERING

## PRINCIPLES AFFECTING THE PERFORMANCE OF MECHANICAL SUGAR BEET PLANTERS

(Publication No. 1149)\*

Walter Monroe Carleton, Ph.D.  
Michigan State College, 1948

The production of sugar beets requires two principal labor peaks; one for spring blocking and thinning and the other for harvest in the fall. Much progress has been made in the mechanical harvesting of sugar beets and commercial machines are now available which will successfully eliminate hand labor. Progress has also been made in seeding machines and planting techniques but much hand labor is still the rule for spring work. This investigation was made to determine some of the factors which influence emergence of sugar beets and to devise ways and means of improving the emergence. The long-time objective is the elimination of hand work from the production of sugar beets.

Research on planting equipment has been carried on along two main lines:

1. Precision planting. As late as 1930 sugar beet drills were made to scatter along the row approximately 15 to 20 pounds of whole seed per acre. Machines now available are capable of metering and distributing about 4 pounds of segmented seed per acre.
2. The determination and improvement of those elements which may improve the effectiveness of planters or planting methods on field germination. Some progress has been made in this

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work but new devices or techniques must be proved in the field over a period of years.

A new type of rolling wheel furrow opener was designed and used in the experimental work. The results of field tests indicate that certain planting treatments which include this opener are better than conventional planting methods but final judgment must be reserved until the opener has been tried for more seasons.

A pneumatic compaction wheel which imparted a uniform and consistent pressure upon the soil was found to be better than a cast-iron compaction wheel. Greater unit pressures by the compaction wheel resulting in heavier soil compactations around the seed were found to give better emergence than the lighter compactations, especially under drier seed-bed conditions.

Greenhouse tests were used to determine the comparative performance of the experimental openers with the performance of plantings made under conditions of known compaction. Compactations resulting from the application of a static pressure of a maximum of 4 pounds per square inch on the soil were found to be statistically better as measured by plant emergence, than compactations obtained by the application of lower pressures down to 1 pound per square inch.

It was found that the air permeability test of soil was a satisfactory method in the laboratory of comparing the compaction effects of furrow openers with the effects of known static pressures on the soil. The checking of planting procedures by laboratory and greenhouse experiments permitted planter research to be carried out more rapidly than by usual summer field experiments only.

A new machine for more accurately and scientifically measuring the compaction of soil was designed and built. This machine was successfully used to evaluate compaction treatments used in the planting experiments and provides a valuable tool for use in soils, planting, and tillage research.

## ASTRONOMY

### AN ANALYSIS OF THE MOTIONS OF THE B STARS IN ORION

(Published No. 1136)\*

Harry Morrison Bendler, Ph. D.  
University of Michigan, 1949

The motions of the stars of spectral type B in the region bounded by hour circles at  $5^{\text{h}} 14^{\text{m}}$  and  $5^{\text{h}} 40^{\text{m}}$  in right ascension and by parallels of declination at  $+4^{\circ}$  and  $-9^{\circ}$  have been investigated on several occasions.

The earliest published investigations were those of Kapteyn in 1918 and Rasmussen in 1921. Both of these investigators found elements for a cluster motion that would be in reasonable accord with the values to be expected if the group motion of the stars was merely a reflection of the solar motion. It will be recalled that the best system of proper motions available at that time was the Preliminary General Catalogue, which has since been shown to be afflicted with serious systematic errors, and that radial velocities were available for only the brightest of the stars in this region.

The question of the cluster motion was reopened by H. Schloss in 1936. Starting with the elements of the cluster motion determined by Rasmussen, Schloss searched all the stars of known proper motion and radial velocity for those stars whose motions were in agreement with the assumed elements. In this way Schloss found ninety-one stars, of all spectral types, that he considered as forming the Orion cluster. Most of the early type B stars originally assigned to

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the cluster by Rasmuson were rejected. It is shown that this procedure of Schloss is invalid in that it does not take into account the possibility of the agreement of some stars with any preassigned cluster motion due to the known dispersion in the space velocities of the stars.

Since there has been a considerable increase in the quantity and accuracy of the proper motion and radial velocity data since the work of Kapteyn and Rasmuson, it is thought worthwhile to again discuss the motions of these stars.

From the radial velocity data it would seem that a group of some twenty stars may be distinguished from the total of sixty-two stars of known radial velocity in this region, and of spectral type B5 or earlier. The dispersion of the radial velocities of this smaller group is 2.3 km/sec and the mean radial velocity, relative to the sun, is  $+30.6 \pm 0.9$  km/sec.

The proper motions of the 0 through B5 stars were examined independently of the proper motions of the B8 and B9 stars. In neither case was it possible to distinguish cluster from non-cluster stars on the basis of proper motions. In examining the proper motions of the B8 and B9 stars evidence was found for an error in proper motion depending on apparent magnitude in the Yale Zone Catalogues, from which the proper motions of the B8 and B9 stars were taken.

## BACTERIOLOGY

### THE EFFECT ON TOXIN PRODUCTION AND GROWTH OF PASSING AND CO<sub>2</sub> THROUGH DEEP BROTH CULTURES OF CORYNEBACTERIUM DIPHTHERIAE

(Publication No. 1095)\*

Rafael Cordova-Marquez, Ph. D.  
University of Michigan, 1949

The toxin of the diphtheria bacillus is usually produced by growing the germ in shallow layers of broth thus stressing the need of oxygen for the synthesis of this metabolic product. The present study is an investigation of the influence of the aeration of deep broth cultures on toxin production and growth.

The medium selected for toxin production (Wadsworth and Wheeler, 1934) was distributed in 350 ml quantities in flasks giving a depth of 6 cm. It was inoculated with the Park 8 strain of C. diphtheriae, and placed at 34°C for 5 to 7 days. Sterile air under pressure was passed continually through the cultures at rates varying from 50 to 600 ml of air per minute. One hundred ml of air per minute favored the highest yield of toxin, namely, 9 Lf units. Rates above and below this value were associated with lower yields. The unaerated deep culture and the shallow layer culture controls gave 3 Lf and 11 Lf units respectively. When the formula of the medium was changed to include maltose, sodium acetate and ferrous ions, the optimum rate of aeration was 400 ml per minute with yields of 38 Lf units at the end of seven days of incubation. The shallow layer control cultures gave values of 25 Lf units. Reproduction of

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the germ was greatly stimulated especially during the first seventy-two hours of incubation.

Carbon dioxide was introduced in varying tensions from 1 to 10 per cent simultaneously with the air at a rate of 100 ml per minute. Maximum yields of toxin, 42 Lf units, were obtained when 4 per cent  $\text{CO}_2$  was present. No information was gained in these experiments as to the mechanism by which  $\text{CO}_2$  increased the yields of toxin, but the maintenance of a reaction of the medium on the alkaline side seemed to be a factor. With the addition of  $\text{CO}_2$  to the cultures, the lag phase was notably shortened, the cultures becoming turbid a few hours after the initiation of the experiments.

Certain problems arose during this study and were investigated as time permitted. The seeming need of the cells for more oxygen when maltose, sodium acetate, and ferrous ions were added to the basic medium, suggested the exploring of this observation with the aid of the Warburg apparatus. The data obtained with this instrument revealed an increase in respiration in the presence of maltose-acetate and iron as compared with either maltose or acetate alone, but no explanation as to its mechanism was forthcoming. Two methods were employed to liberate the intracellular toxin in washed cells of C. diphtheriae, namely, sonic vibrations and mechanical grinding. The subsequent yields of toxin were very small. The use of sonic vibrations seemed more efficient for the rupturing of the cells. Finally, it was observed that suspensions of washed cells of C. diphtheriae survived best when stored at  $-48^{\circ}\text{C}$  suspended in PSS. Other chemical solutions such as 2-per cent glycine, phosphate buffer, and proteose peptone were less favorable although the cells remained viable in all solutions at  $-48^{\circ}\text{C}$  for 6 months.

THE INFLUENCE OF BACTERIOPHAGE, ANTIBIOTICS,  
AND Eh ON THE LACTIC FERMENTATION OF  
CUCUMBERS

(Publication No. 1150)\*

Louis William Faville, Ph.D.  
Michigan State College, 1948

Considerable losses are suffered by the pickle industry each year as the direct result of spoilage caused by aerobic sporogenic bacteria. The purpose of this study was to investigate factors which might contribute to this spoilage.

First, it was shown that bacteriophage races capable of lysing strains of Lactobacillus plantarum, the organism chiefly responsible for the fermentation of cucumbers, were present in soil in which cucumbers were grown. Attempts to isolate this bacteriophage from water or from genuine dill pickle brines in which spoilage had occurred six to eight months previously were unsuccessful.

Two species of aerobic sporogenic organisms isolated from the brines of spoiled pickles were found to be capable of producing antibiotic substances which inhibited the growth of L. plantarum. These same species, Bacillus mesentericus fuscus and Bacillus vulgaris, were also able to elaborate pectin-hydrolyzing enzymes which were responsible for the softening of cucumber pickles.

A study of the oxidation-reduction potential curves of six species of aerobic spore-formers isolated from spoiled brines showed that all of these organisms were capable of reducing the potential of

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the medium to a considerable degree while L. plantarum was non-reducing.

Increasing concentrations of sodium chloride increased the length of time required by this organism to reduce the oxidation-reduction potential of the medium to a level at which multiplication of the cells could occur.

When increasing concentrations of lactic acid were added to the medium the effect was similar to that obtained with salt alone but when lactic acid and sodium chloride were added concurrently these effects were additive, thus indicating that the salt tolerance of these organisms decreases with increasing concentrations of lactic acid.

The results of these observations of the influence of salt on the time-potential curves of these organisms suggest that at least part of the bacteriostatic effect of sodium chloride is due to its action on the reducing enzymes of the organisms. This is further substantiated by the fact that most of the spoilage organisms could be induced to grow in significantly higher concentrations of salt when the oxidation-reduction potential of the medium was reduced by the addition of glucose and indigo carmine to the minimum level established by the organisms during normal growth.

## BOTANY

### MORPHOLOGICAL STUDIES IN THE GENUS NOCARDIA

(Publication No. 1113)\*

Norvel Myrl McClung, Ph.D.  
University of Michigan, 1949

This paper deals with the morphology of a genus of actinomycetes, Nocardia (Proactinomyces). The work is divided into two parts: the first concerns developmental morphological studies of 18 strains of Nocardia, made by recording the growth by means of camera lucida drawings of young colonies from single cells or hyphal fragments; in the second the cytology of one strain principally, P. ruber (Casabó) Baldacci, is investigated by the use of microchemical tests and the electron microscope.

The morphological studies showed that there are three types of fragmentation characteristic of various strains. In type 1 the dividing hyphae bend to a sharp angle, with the separation occurring at the apex of the bend. Following division the hyphal tips grow out parallel to each other. Type 2 takes place in a straight or gently curved hypha. The newly formed hyphal ends bend slightly and grow past each other. Type 3 occurs in the parent hypha at the juncture of a branch. Following division, the new hyphal tip bends and grows out. A new branch may arise at or very near the point of separation.

On the basis of mycelial development the genus Nocardia is divided into three groups. There are strains which show intermediate development between each group. Group I is characterized by a sparse mycelial development, few branches, and fragmentation

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is typically type 1. In Group II there is a more extensive mycelium developed, the branches are more profusely produced and are not contorted, and fragmentation is characteristically type 3. In Group III the branching is generally prolific and contorted, and there is no fragmentation of the mycelium.

Cytological studies reveal a thin, plastic cell wall in P. ruber. The cytoplasm presents a vacuolar structure containing two kinds of granules that can be distinguished by shape, distribution and opacity to the beam of electrons. The nature of these granules was investigated by microchemical tests. The spherical, opaque ones were found to possess the solubilities of nuclear nucleoproteins, but not those of volutin. They stain deeply with methylene blue, and Sudan Black B. The more diffuse granules located in the center of fragments can be demonstrated in material that has been grown on nitrogen-free medium by means of the electron microscope. Under certain conditions this granule becomes more opaque, less diffuse, and at the same time the spherical granules decrease in size. Thus the nature of these granules is complex but unknown from the present studies.

Strains 18-2 and 21-3 show a more homogeneous cytoplasmic structure. The cell wall in these strains is easily demonstrated because of the frequent presence of empty spaces between cytoplasmic areas in hyphae, and "ghost filaments." Strain 21-3 shows the presence of spherical opaque granules irregularly distributed in filaments.

# CHEMISTRY

## CYCLIC ACETALS

(Publication No. 1088)\*

Floyd E. Anderson, Ph.D.  
University of Michigan, 1949

Paraldehyde has been described as one of the best and least toxic hypnotics, although its use is restricted because of its burning, disagreeable taste and the odor which it imparts to the breath.

Since cyclic acetals, for example 2,4,6-trimethyl-1,3-dioxane and 2,4,5-trimethyl-1,3-dioxolane, are closely related in structure to paraldehyde, it seemed desirable to test a number of cyclic acetals and ketals in the hope that compounds might be found which would possess the hypnotic activity of paraldehyde but be free from its undesirable side effects.

Knoefel (J. Pharmacol., 53, 440 (1935)) had already tested several monomethyl-, dimethyl- and one trimethyldioxolane (2,4,5-trimethyl-1,3-dioxolane) and found that the latter substance possesses appreciable hypnotic activity in comparison with paraldehyde. It seemed to us that possibly greater activity might be found in more highly substituted dioxolanes and dioxanes.

Ten dioxolanes and five dioxanes were prepared. Although a few of the cyclic acetals which were synthesized represent known compounds, as far as we are aware, they had not been tested hitherto for hypnotic potency.

Our products were examined pharmacologically by Dr. H. W. Werner and Miss Barbara B. Brown in the Wm. S. Merrell Company Laboratories. Most of the

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compounds proved to be inactive except 4,6,6-trimethyl-1,3-dioxolane and 2-isopropyl-4-methoxy-methyl-1,3-dioxolane. Although the activity of the two latter compounds was similar in degree to that of paraldehyde they, too, produced a "bad breath."

The dioxolanes and dioxanes were prepared, by the general method of H. T. Clarke (J. Chem. Soc., 101, 1804 (1912)), from an aldehyde and the required glycol in the presence of a small amount of 85% phosphoric acid.

Another group of products which was studied consisted of 2,2-di-aryl-4-dialkylaminomethyl-1,3-dioxolanes. A typical example of this group, 2,2-di-phenyl-4-diethylaminomethyl-1,3-dioxolane, was found to be devoid of hypnotic properties but, like other basic dioxolanes which were prepared, it exhibited antihistamine activity. A further study of basic dioxolanes may lead to the discovery of clinically useful drugs.

It was found that by condensation of epibromohydrin with benzophenone, in the presence of stannic chloride, the crystalline 2,2-diphenyl-4-bromomethyl-1,3-dioxolane could be obtained in good yield. The latter substance was obtained also by a second procedure in which diphenyldimethoxymethane and glycerol-alpha-monobromo-hydrin were mixed and subjected to distillation until all of the methanol had distilled. The residue, after trituration with isopropyl alcohol, consisted of practically pure 4-bromomethyl compound (82% yield).

2,2-Diphenyl-4-bromomethyl-1,3-dioxolane was animated with amines such as dimethyl-, diethyl-, dipropyl-, dibutyl- and iso-propylamine and with piperidine and morpholine. It was possible to purify all of the basic products by distillation under reduced pressure except the 2,2-di-(alpha-thienyl) compound. The morpholino derivative was a crystalline substance; all of the other bases were oils. Except for the 2-phenyl-2-(alpha-thienyl) derivative, all of

the bases could be converted into crystalline salts - hydrochlorides, hydrobromides or oxalates.

When treated with excess aqueous mineral acid, the basic dioxolanes dissolved, and then were decomposed very rapidly into a ketone and the salt of a basic glycol.

## MAGNETIC SUSCEPTIBILITY OF WEAKLY PARAMAGNETIC SUBSTANCES

(Publication No. 1097)\*

Juan Daniel Curet-Cuevas, Ph.D.  
University of Michigan, 1949

Measurements of the magnetic susceptibility were performed on the three modifications of NiS on the one hand, and on  $\text{Li}_2\text{CrO}_4$ ,  $\text{Na}_2\text{CrO}_4$ ,  $\text{K}_2\text{CrO}_4$ ,  $\text{Tl}_2\text{CrO}_4$ ,  $\text{MgCrO}_4$ ,  $\text{BaCrO}_4$ ,  $\text{KMnO}_4$ ,  $\text{CsMnO}_4$ ,  $\text{AgMnO}_4$ ,  $\text{K}_2\text{SO}_4$ , and  $\text{Tl}_2\text{SO}_4$  on the other hand. For the latter a microbalance, based on the principle of the Gouy method was used, which permits determinations of the specific susceptibility accurate to  $0.001 \times 10^{-6} \text{ cc/g}$ .

The molar magnetic susceptibility, expressed in  $10^{-3} \text{ cc/mole}$ , of the amorphous  $\alpha$ -NiS, easily soluble in acids, is  $\geq 2.0$ ; of the hexagonal  $\beta$ -NiS, soluble in hot acids, 0.19; of the rhombohedral  $\gamma$ -NiS, slowly formed from  $\text{Ni}^{2+}$  and  $\text{H}_2\text{S}$  in a hot acidic solution,  $\leq 0.09$ . The first value is of the same order of magnitude as, and the last two values very much smaller than, the spin only susceptibility 3.44 calculated for the free gaseous  $\text{Ni}^{2+}$  having two unpaired electrons.

The differences among the three modifications of NiS in the magnetic susceptibility, in the conditions of formation from  $\text{Ni}^{2+}$  and  $\text{S}^{2-}$  ions, and in chemical behavior are discussed from the point of view of the quanticule theory of molecular structure recently developed by K. Fajans and associates. It is concluded that, in the formation of  $\alpha$ -NiS from  $\text{Ni}^{2+}$  and  $\text{S}^{2-}$ , at least 70% of the ions retain their quantum configura-

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tion in spite of the strong continuous deformation shown by the dark color and small solubility in water. In the formation of  $\gamma$ -NiS, a discontinuous change of the electronic configuration of at least 97% of the  $\text{Ni}^{2+}$  and  $\text{S}^{2-}$  ions occurs, as a result of which the unpaired electrons become paired. The  $\beta$ -NiS is intermediate between the  $\alpha$ - and  $\gamma$ -forms and nearer to the latter.

The results obtained on the salts containing the permanganate and chromate ion were used in order to examine whether cations of noble gas and non noble gas type exert a pronounced effect on the paramagnetic component of the susceptibility of these weakly paramagnetic anions.

The deviations from additivity of the molar susceptibilities, expressed in  $10^{-6} \text{ cc/mole}$ , derived from several combinations of four salts involving the permanganates and/or the chromates varied between 1.6 and 3.3. This is the same order of magnitude as that of the largest deviation from additivity which can be derived from measurements of F. E. Hoare and G. W. Brindley on the alkali and alkaline earth halides involving diamagnetic ions only. Therefore no specific influences of cations on the paramagnetic component of the susceptibility of the permanganate and chromate ions can be deduced from the data available at present.

## REACTIONS OF 2-ARYLCYCLOHEXANONES

(Publication No. 1121)\*

Lawrence Bernard Wick, Ph. D.  
University of Michigan, 1948

It appeared that 2-phenylcyclohexanone and 2-(p-methoxyphenyl)-cyclohexanone would be useful intermediates for the synthesis of analogs of the alkaloid morphine, the resin acids and the sex hormone estrone. This thesis is a study to determine the feasibility of using 2-arylcyclohexanones to prepare analogs of these compounds.

The Mannich reaction between 2-phenylcyclohexanone, dimethylamine and formaldehyde gave 6-(dimethylaminomethyl)-2-phenylcyclohexanone hydrochloride. The structure of the Mannich base was proven by treatment with diethylmalonate in the presence of powdered sodium hydroxide followed by hydrolysis and decarboxylation to give 2-oxo-3-phenylcyclohexanepropionic acid. This acid was prepared by a separate route. 2-Phenylcyclohexanone was brominated to give 2-bromo-2-phenylcyclohexanone. Treatment with benzyltrimethylammonium hydroxide ("Triton B") followed by acrylonitrile removed the elements of hydrogen bromide and gave 2-oxo-3-phenyl-3-cyclohexenepropionitrile. Hydrolysis, hydrogenation of the double bond and the keto group, followed by chromic acid oxidation gave the same 2-oxo-3-phenylcyclohexanepropionic acid. For comparison, 2-oxo-1-phenylcyclohexanepropionic acid was prepared by the hydrolysis of 2-oxo-1-phenylcyclohexanepropionitrile.

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This acid proved to be different from the 2-oxo-3-phenylcyclohexanepropionic acid prepared by either of the above two methods.

6-(Dimethylaminomethyl)-2-methyl-2-phenylcyclohexanone hydrochloride was prepared by the reaction between 2-methyl-2-phenylcyclohexanone, dimethylamine and formaldehyde. This compound and 6-(dimethylaminomethyl)-2-phenylcyclohexanone hydrochloride possess structural similarities to morphine. The Mannich reaction with 2-phenylcyclohexanone and 2-methyl-2-phenylcyclohexanone was also run with diethylamine, piperidine and morpholine.

Glyoxalation of 2-methyl-2-phenylcyclohexanone, followed by decarbonylation and methylation gave methyl 1,3-dimethyl-2-oxo-3-phenylcyclohexanecarboxylate, an important intermediate in a proposed synthesis of desoxypodocarpic acid. It was not found possible to conduct the Reformatsky reaction with this  $\beta$ -keto ester, probably because the carbonyl group is in a highly hindered position. Decarboxylation gave 2,6-dimethyl-2-phenylcyclohexanone, which also proved to be resistant to the action of zinc and methyl bromoacetate.

The conditions for a 50% yield of 2-(p-methoxyphenyl)-cyclohexanone by the reaction between p-methoxyphenylmagnesium bromide and 2-chlorocyclohexanone were worked out. The structure of the ketone was proven by the preparation of 2-methoxyphenanthrene through the Reformatsky reaction, dehydration and hydrolysis, hydrogenation, cyclization, Clemmensen reduction of the new 7-methoxy-9-oxo-1,2,3,4,4a, 9,10,10a-octahydrophenanthrene, and dehydrogenation.

The reaction of 2-phenylcyclohexanone and 2-(p-methoxyphenyl)-cyclohexanone with dimethyl oxalate gave the  $\gamma$ -lactone of 2-hydroxy-3-phenyl-2-cyclohexeneglyoxalic acid and the  $\gamma$ -lactone of 2-hydroxy-3-(p-methoxyphenyl)-2-cyclohexeneglyoxalic acid instead of the expected glyoxalates. The lactones were enolic in nature and derivatives such as ethers and

acetates were made. Glyoxalation of methyl 2-oxo-1-cyclohexanecarboxylate also gave a cyclic lactone.

The synthesis of 4-methyl-4-phenyl-1-hydrindanone, an analog of the sex hormone estrone, was accomplished by the following method: The Reformatsky reaction with 2-methyl-2-phenylcyclohexanone followed by dehydration and hydrolysis gave the unsaturated acids, 6-methyl-6-phenyl-1-cyclohexeneacetic acid and 2-methyl-2-phenylcyclohexylideneacetic acid. Lengthening of the chain by means of the Arndt Eistert reaction followed by cyclization with zinc chloride in acetic anhydride gave 4-methyl-4-phenyl- $\Delta^{8,9}$ -hydrindenone. Hydrogenation of the double bond and the carbonyl function, followed by chromic acid oxidation gave 4-methyl-4-phenylhydrindanone. To prove the structure, 4-methyl-4-phenyl- $\Delta^{8,9}$ -hydrindenone was degraded to 4-phenylhydrindene by Clemmensen reduction followed by selenium dehydrogenation. For the synthesis of 4-phenylhydrindene, 2-biphenylacetic acid was prepared by two methods. The first method involved the Arndt Eistert synthesis with 2-biphenylcarboxylic acid. The second route involved the Reformatsky reaction on 2-phenylcyclohexanone followed by dehydration, dehydrogenation and hydrolysis. The Arndt Eistert reaction on 2-biphenylacetic acid followed by Friedel-Crafts cyclization and Clemmensen reduction gave 4-phenylhydrindene, identified as its sulfonamide.

THE TEMPERATURE COEFFICIENT OF THE  
CERIC-CEROUS ELECTRODE

(Publication No. 1133)\*

Richard Bell Saltonstall, Ph. D.  
Michigan State College, 1935

The potential of the ceric-cerous electrode in 0.5 formal sulphuric acid utilizing double salts of cerium is measured at three temperatures; the effect of the ammonium sulphate on the potential of the electrode is determined and the decrease in heat content and decrease in free energy for the reaction



have been calculated.

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FRITZ LUDWIG STRAUS, 1877-1942

(Publication No. 1134)\*

Heinrich Hauptmann, Ph. D.  
University of Breslau, Germany, 1929

Fritz Ludwig Straus was born in Mannheim (Baden) on March 24, 1877. He studied chemistry in Freiberg (Saxonia), Heidelberg and finally in Munich where he graduated as a Ph. D. summa cum laude in 1901. When Dr. Thiele, in whose laboratory he had prepared his doctor's thesis, was transferred to Strasburg, he went with him as his assistant. Straus was named lecturer in 1905, head of the department of organic chemistry in 1907 and titular professor in 1910. After serving at the West Front during the First World War he became extraordinary professor in 1917; however, in 1918, when Strasburg was ceded to France, he was forced to leave this position. In 1919 he was appointed director of the Chemical Institute of the Handelschochschule Berlin and in 1923 he got a call as professor of the Institute of Organic Chemistry at the Technische Hochschule Breslau. Being a Non-Arian he was relieved of his position in 1933; however, a few months later, he was reinstated due to the fact that he had fought in the front lines during the war, and in 1934 he was transferred to the University of Berlin as professor in the Inorganic Chemistry Laboratory. He was definitively dismissed in 1936 and in 1939 emigrated to the United States where he became research director of the Ecusta Paper Corporation. He died of a coronary thrombosis on April 8, 1942.

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In his scientific work Straus was engaged in the study of unsaturated compounds. His investigations concerning the acetylene bond, in particular the hydrogenation of the conjugated triple bond in diphenyl-diacetylene and the resulting stereoisomeric diphenylbutadienes and butenynes, the demonstration of the 1.2-addition of Br to diphenylbutadiene, which represents the first limitation of Thiele's rule of the 1.4-addition in conjugated double bonds, are all classic. Other papers of Straus dealt with partially hydrogenated naphthalenes and their derivatives. He explained the mechanism of the stepwise hydrogenation of naphthalene to tetralene and described for the first time a method for the preparation of  $\Delta^2$ -dihydronaphthalene. In his papers "On the substitution of the positive hydrogen by halogen" he also starts with the unsaturated compounds, i.e., propiolic acid and diacetylene. After checking and correcting the data of the latter compound, he proceeds to the dihalogen-diacetylenes and, by clarifying the mechanism of the reaction with hypohalogenites, to a number of halogen compounds which are formed by substitution of the hydrogen of active methylene groups, such as indene, cyclopentadiene, malonic acid, etc. In another important series of papers "On benzalacetone and triphenylmethane" he deals with halogen derivatives of unsaturated aromatic ketones which show a surprisingly high reactivity. By relating their electrolytic character to their unusual color, important theoretical viewpoints for the relation between color and constitution are developed. The preparative evaluation of this knowledge led to the direct addition of substituted halogen alkyls ( $\alpha$ -methoxyhalogenides) to ethylene double bonds.

As a teacher Straus had few rivals. His clear and logic lectures were outstanding. His sincere character and kindness made him extremely popular with his students, co-workers and colleagues. His abilities as a scientist and organizer and his personality made him likewise respected and appreciated in his new sphere of activity.

## ADSORPTION OF ALIPHATIC AMINE VAPORS BY SILICA GEL

(Publication No. 1138)\*

Donald Gene Dobay, Ph.D.  
University of Michigan, 1949

The isotherms for the adsorption of diethylamine, n-butylamine and di-n-butylamine by silica have been determined gravimetrically. At 25°C., the entire pressure range from zero to saturation was investigated; at 40°C., part of this pressure range was investigated. The apparatus used differed from previous designs in that provisions were made for maintaining constant pressure in the adsorption chamber over long periods of time and also in that organic contaminants such as stopcock and vacuum greases were effectively excluded.

The isotherms were sigmoidal in shape and exhibited a definite saturation limit to the amount that could be retained by the gel. With each amine it was found that the silica surface became covered with a monolayer at the low relative pressure of 0.01, indicating the existence of strong forces between the amine molecules and the silica surface.

The adsorption could be represented by a three-constant Brunauer-Emmett-Teller equation up to relative pressures of about 0.3; at the higher relative pressures these equations were no longer applicable.

A high degree of concordance was obtained in the values of the mean capillary radius of the gel as calculated by application of the Kelvin equation to the

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isotherm data, despite the greater than hundred-fold difference in the vapor pressures of the three amines. This was taken to indicate that capillary condensation occurs in addition to multimolecular adsorption.

Differential isosteric heats of adsorption were determined from the isotherms. At the lower pressures the heat of adsorption was found to be as much as four times as great as the heat of condensation. At somewhat higher pressures, the differential heat of adsorption approached the heat of condensation. This was in complete accord with the other conclusions reached here: namely that at low relative pressures high attractive forces exist resulting in what may be termed chemisorption; at intermediate relative pressure capillary condensation (as determined by the curvature of the adsorbed liquid surfaces) occurs.

Free surface energy changes were calculated for the adsorption systems. When the change in free surface energy was considered as a function of the relative pressure an inflection point was noted at the relative pressure corresponding to the inception of the hysteresis. This may enable location of the region of adsorption-desorption hysteresis from adsorption data alone. When the change in free surface energy was considered as a function of the amount adsorbed, several changes in the slope of the curve were noted. These have been interpreted thermodynamically and have indicated the existence of two disparate phenomena in the adsorption of the amines by the silica gel. The conclusions reached from the consideration of the change in free surface energy are in complete accord with the conclusions reached from consideration of the form of the isotherms and of the heat of adsorption.

## THERMODYNAMIC ANALYSIS OF NON-IDEAL VAPOR-LIQUID EQUILIBRIUM

(Publication No. 1142)\*

Harry Herman Steinhauser, Jr., Ph.D.  
University of Michigan, 1949

This thesis presents original experimental vapor-liquid equilibrium data at atmospheric pressure for the ternary methyl ethyl ketone- n heptane-toluene system and its three corresponding binary systems, and for the binary methyl ethyl ketone - benzene system. The data are shown to be thermodynamically consistent to  $\pm .002$  mol fraction units in composition and to  $\pm .2^\circ\text{C}$  in temperature.

The experimental vapor-liquid equilibrium data were determined in an Othmer still which was connected to a device for maintaining the pressure in the still at  $760 \pm .1$  mm. of mercury. The reliability of the experimental procedure was first tested by comparing data obtained on the ethanol-water system with the data of other investigators which have been reported in the literature. All the data which were determined on this system fall within the limits of accuracy of the data in the literature. These limits are  $\pm .004$  mol fraction units in composition and  $\pm .2^\circ\text{C}$  in temperature. Therefore, the experimental method may be considered at least that accurate.

A thermodynamic check of the experimental data by integration of the Gibbs-Duhem equation was carried out for the binary systems by the methods suggested by Dodge and others.

A procedure for the graphical integration of the

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Gibbs-Duhem equation in ternary, two phase vapor-liquid systems is developed in this paper and used to test the methyl ethyl ketone-n heptane-toluene equilibrium data for thermodynamic consistency. The method is shown to be generally applicable to any system in which the vapor phase is an ideal gas mixture.

The results of these integrations show the experimental data are thermodynamically consistent to  $\pm .002$  mol fraction units in composition and to  $\pm .2^\circ\text{C}$  in temperature. These results are presented in tables and compared with the experimental data in graphs.

A further test of the data is afforded by a correlation of the ternary equilibrium data using White's modification of the van Laar equation. The agreement between the calculated and experimental data is excellent for a correlation in a ternary vapor-liquid equilibrium system; the calculated and experimental compositions differ by less than .01 mol fraction units except for two points. The temperatures are less accurate, with agreement of better than  $.5^\circ\text{C}$  over most of the diagram. However, this agreement is very good. The experimental and calculated data are compared in tables.

The refractive index and density tables which were prepared from original experimental data for the analysis of liquid and vapor samples in the laboratory are also included. The refractive index and density data at  $25^\circ\text{C}$  cover the complete ternary system. A refractive index table for the methyl ethyl ketone-benzene system is also presented. The original experimental determinations of these two physical properties are included in the thesis.

The thesis concludes that a thermodynamic test of the accuracy of experimental vapor-liquid equilibrium data can still be most readily made by using an analytical expression such as White's equation. Relatively little work is needed to evaluate the constants,

and the results are probably as satisfactory for most purposes as those which might be obtained by the graphical method. In those cases, however, where an analytical correlation is unsatisfactory, the graphical procedure developed in the thesis will lead to thermodynamically consistent results.

## STUDIES ON 1-VINYLNAPHTHALENE IN THE DIELS-ALDER REACTION

(Publication No. 1161)\*

Norman Custer Deno, Ph.D.  
University of Michigan, 1949

The Diels-Alder reaction is defined as the formation of a cyclohexene from a diene and an olefin (usually termed the dienophile). Two categories are recognized. In the usual examples the reaction is initiated by the positive (electrophilic) olefin. In three examples described in this paper a positive (electrophilic) diene initiates the reaction.

1-Vinylnaphthalene acted as a diene to yield 1,2,3,4-tetrahydrophenanthrene derivatives with nine olefins. With two  $\alpha$ -halogen olefins, the halogen acid split out of the adduct to yield 3,4-dihydrophenanthrene derivatives. With three dienophiles dehydrogenation occurred to yield phenanthrene derivatives.

1-Vinylnaphthalene acted as the dienophile towards three butadiene-1-carboxylic acids to yield 1-( $x$ -cyclohexenyl)-naphthalene-2'-carboxylic acid derivatives. This represents a new synthesis for partially hydrogenated biaryls. They are also the first unequivocal examples of a positive (electrophilic) diene initiating the reaction.

1-Vinylnaphthalene acted as both diene and dienophile in dimerizing to 1,2,3,4-tetrahydro-1-(1'-naphthyl)phenanthrene.

The results are discussed in the light of current electronic theories and shown to be in agreement with the general principles of the Robinson-Ingold theory.

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Twenty-four ultra-violet absorption spectra have been recorded. Thirteen of these exhibit steric inhibition of resonance.

The non-planarity of dienes, as evidenced by steric inhibition of resonance in their spectra, has been correlated with their non-reactivity as dienes in the Diels-Alder reaction.

A number of interesting dehydrogenations, cyclizations, and other degradations with sulfur, palladium, and soda-lime have been recorded in connection with structure proofs.

Finally, a complete theoretical discussion of the Diels-Alder reaction from the viewpoint of steric and polar requirements has been included.

## CHEMISTRY, PHYSICAL

### PRESSURE VOLUME TEMPERATURE RELATIONSHIPS AND PHASE EQUILIBRIA IN THE SYSTEM ETHYLENE-NORMAL BUTANE

(Publication No. 1123)\*

Brymer Williams, Ph. D.  
University of Michigan, 1949

This dissertation presents the results obtained in the experimental investigation of the binary hydrocarbon system, ethylene-normal butane. The pressure-volume-temperature relations at the liquid-vapor phase boundaries and in the single phase regions were determined for four mixtures of this system. The experimental results are reported as such, and in the form of generalized equilibrium constants and densities.

By comparison with other binary systems, it was found that the volatility of ethylene in butane solutions is considerably greater than that of a corresponding, but necessarily hypothetical, paraffin hydrocarbon.

The deviations from the ideal gas law of the mixtures in the gaseous region were compared with those of pure ethylene and pure butane. Upon the bases of reduced pressures and temperatures, the compressibility factors agreed remarkably well.

The construction and operation of the apparatus, which is suitable without modification for the study of other gaseous mixtures, is described.

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## DRAMA, AMERICAN

### THE LIVING NEWSPAPER: A STUDY OF THE NATURE OF THE FORM AND ITS PLACE IN MODERN SOCIAL DRAMA

(Publication No. 1127)\*

Marjorie Louise Platt Dycke  
New York University, 1948

The Living Newspaper, developed by the New York area of the Federal Theatre Project, 1935-1939, is a form of documentary theatre. Its themes, the most important element of the form, are aspects of important current social, political, economic, or scientific problems, or a combination of any or all of these. There are no plots but rather "construction frames" which carry the themes. The numerous characters are types, abstractions, or impersonations of actual people -- none drawn three-dimensionally. The dialogue is highly selective -- brief, colloquial, dynamic. The style, worked out in brief episodes, is a combination of stylized and realistic drama. Tempo is carefully plotted within and between scenes. Staging techniques, an integral part of the form, are written into the play by the author.

The Living Newspaper has two inseparable purposes: to entertain and to educate.

Although the Living Newspaper is part of a large movement in the theatre, begun in its modern manifestations in Russia and Germany, to make the stage a force in education for citizenship, it is not simply an imitative form. The Living Newspaper is original in that it presents a carefully planned, painstakingly documented account of current issues in sustained, dramatic stage form, intended to evoke political action within a democratic framework. In making statistics a subject of absorbing drama on the

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stage, the Living Newspaper added new power to the methods of social drama. By combining a number of dramatic styles effectively, it opened new horizons for the playwright of the future.

From an inauspicious start with Ethiopia, banned by the State Department on its opening night, the Living Newspaper grew into a powerful socio-dramatic force culminating in Power and One-Third of a Nation. The New York productions were shown in other parts of the country, and other areas of the Federal Theatre Project were stimulated to create their own Living Newspapers based on local and national issues. These were still being planned and produced when the Congress put an end to the Federal Theatre in 1939.

During the period when the Federal Theatre was active, the Living Newspaper inspired counterparts outside its gates. After its demise, one commercial production was attempted, and then the form seemed to die out until World War II when the Government revived the technique for two productions. Also during the war, the British Government sponsored Living Newspapers and has continued to do so in the post-war period. Private organizations in the United States are beginning to rediscover the form.

Advantages of the Living Newspaper technique are: the use of the scientific method in studying problems; the presentation of social, political, economic, and scientific theory in human terms; education with an emotional impact; directness of message; the strong unity of a single theme; diversified means of expressing that theme; constructive criticism of the status quo; integration of fact in meaningful relationship; public interest; artistic experiment; immediate importance; local interest; significant art; suitability for amateur production; facility of adaptation.

Weaknesses to be guarded against in the use of the technique are: diffuseness caused by an insufficiently pointed theme, an attempt to cover too much

ground, or the lack of a point of view; insufficient drama or entertainment in the presentation of facts; unfair bias; oversimplification of the problem; injudicious choice of subject.

Current events and the growth of new organizations interested in, and capable of, using the Living Newspaper technique indicate that the form has a future in the United States, mainly outside the commercial theatre.

The procedure followed in this study has been to use scripts, interviews, studies in dramatic theory, history, and criticism, play reviews, and secondary historical sources, to trace the nature of the Living Newspaper, comparisons and contrasts in the historic soil which bred the Living Newspaper and its predecessors foreign and native, comparisons and contrasts of the Living Newspaper with its predecessors, the growth, decline, and influence of the Living Newspaper, an evaluation of the form, and a possible projection of its future.

## ECONOMICS

### CONSOLIDATED STATEMENTS

(Publication No. 1114)\*

Lloyd Finch Morrison, Ph. D.  
University of Michigan, 1948

When one corporation holds a majority of the shares of a second corporation for the purpose of participating in the activities of the second corporation as an owner rather than as an ordinary investor, the full implications of the share ownership cannot be adequately displayed in the individual corporate statements. On the other hand, consolidated statements which show the over-all economic aspects of the affiliation instead of the exact legal relationships between the ownership interests and the underlying values should be designed to supplement rather than to supplant the corporate statements.

Holding company systems have a dual character, being both one and several at the same time. Incomplete ownership by the controlling company intensifies this duality. The outside or minority interests in the shares of a controlled company relate to a limited area of the values presented in the group statements. The minority should be shown as an ownership interest but should be segregated and presented in the group statements in a manner indicating the limited scope of the claim. In such a situation ownership by the controlling company although incomplete must nevertheless be related to the underlying values. The valuation problems are best resolved for the joint portrayal by revaluing the inventoriable assets and the debt at the date control is established.

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A price paid for the securities which exceeds the revised values attributable to the securities may be accounted for as an intangible asset purchased by the controlling interest alone.

The profit-making activities reported in the consolidated statements should show the effects of transactions between the affiliated companies and the outside world. Revenues will be recognized as they are realized through sales of goods or services to parties unrelated to the group. The costs matched against the revenues to determine the profits of the system will represent the effective costs to the group of the goods or services sold. Assets should be valued at total cost to the system without recognition of intercompany markups in excess of cost, but profits resulting from intercompany markups may be realized to the minority or controlling interests and need not be eliminated from the equity. In general, however, transactions within the group should not be allowed to affect the consolidated portrayal.

Consolidated statements should be prepared to trace the ownership of the controlling interest to its ultimate commitment, to show the obligations and interests associated with the controlling interest, and to present a view of the underlying earning power. Ratios constructed to bring out the equity and earnings relationships which the statements are designed to show should be useful to the investors in the controlling company. Other types of ratios are usually weighted averages of individual company conditions and activities and should only be used as bases of comparison. Neither the preparation nor the interpretation of consolidated statements can be made simple. In the final analysis, properly constructed reports for holding company systems constitute an adequate but cumbersome presentation of the financial data of a complex organization.

## EDUCATION

### PROPOSALS FOR THE DEVELOPMENT OF EDUCATION IN INDIA DERIVED FROM A SYNTHESIS OF OCCIDENTAL AND ORIENTAL SOURCES

(Publication No. 1099)\*

Lalita Manibhai Desai, Ph.D.  
University of Michigan, 1948

India is today in a state of flux. After slumbering for centuries, it has now awakened to a new era, an era of industrial expansion and far-reaching economic changes. It rests between the eve of imperialism and the morn of the new independence, which has brought new problems--political, economic and social. At the same time the entire country is thrilling with a new national spirit and with a vigorous and creative force which has to be directed to revitalize her culture and build a new social order. India can build on the foundation of the glorious past, looking forward for a bright future. For such an important task, it is necessary to utilize all available resources in order to reconstruct its internal life and strengthen its position in the United Nations. Tremendous difficulties and obstacles are in the way, but the problems to which they give rise have to be faced and solved. What, it must be asked, is the role of education under such prevailing conditions? What must the education of the future do to meet the challenge of present conditions?

Basic to the building of the new India is a re-examination and complete overhauling of its educational system. At the present time there can hardly

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be said to be a system at all. Survivals of ancient religious ceremonial training, jostle remnants of Buddhistic and Mohannadan practices, and these in turn are overlayed with a thin veneer of nineteenth century British formalism. Present practice is determined more by traditional acceptance and the strength of vested interest than by the needs of the people today. Valuable elements from India's past are often neglected or superseded by innovations that are accepted without question. As a result, it lacks a proper foundation in the cultural heritage and a recognition of the importance of practical work. It is top-heavy with literary and verbalistic content designed to prepare for administrative jobs. The consequence is the gulf between the masses and the few educated. The curriculum is related neither to local needs nor to the future careers of children. Furthermore, nearly three-fourths of the villages of India, where the 90 per cent of the population resides, are not provided with schools.

Since India has adopted a democratic form of government and offers a universal franchise, it needs a literate and intelligent citizenry. The people will have to be educated in order that they may learn to understand the nature of the work to be done and its importance.

The modern cry--the urgent need--is to provide free compulsory education for all the children of India. To implement this demand, the Wardha scheme and the Sargent scheme have been proposed. In the view of the present writer, they are in need of some fundamental modifications. This study is an attempt to suggest a new line of approach, a re-oriented point of view. It seeks to revive some of the old, indigenous elements in the culture, to adapt certain elements transmitted from other cultures, and to synthesize these to form a basis for a progressive and at the same time a practical system of education suitable to the soil and culture.

This study, therefore, offers some suggestions which might help the citizens of the new India to satisfy their individual and social needs and bring about better human understanding not only among themselves, but also, perhaps, among the different nations and races of the World. The physical, cultural and historical background has been discussed together with the development of education from ancient times to the present. Then attempt has been made to select certain aspects of Indian education and show how the present proposals would modify or supplement either present practice or currently approved suggestions. The proposals derive from India's past and present culture and from the contributions of western methods, and they embody principles valued by all civilized peoples.

## A STUDY OF PERFORMANCE IN CERTAIN PHYSICAL ACTIVITIES WHICH INVOLVE PERSISTENCE

(Publication No. 1100)\*

John Kenneth Doherty, Ph.D.  
University of Michigan, 1948

One hundred thirty five University of Michigan male students participated in three groups of tests, each of which was designed to define and measure persistence in continuing physical effort despite the increasing discomfort which accompanies it. The first two groups of tests assumed the simultaneous occurrence of fatigue effects and persistence and therefore sought to measure them simultaneously. The first effort consisted of a single test which alternated stool-stepping with an arm-hand dexterity test and which attempted to establish a point at which general body fatigue could be objectively fixed as affecting the speed and coordination of a small group of muscles. The second group included two tests: a ball-lifting test in which the effects of fatigue were studied directly and a weight-lifting vs speed-tapping test. In the latter an attempt was made to define persistence by determining the point at which fatigue of a specific group of muscles affected the speed and dexterity of these same muscles in another similar activity. The third group included 14 test items: (1) a hand dynamometer strength test; (2) a finger ergograph test, normal conditions; (3) a finger ergograph test, ischemic conditions; (4) a biceps power test; (5) a biceps endurance test, 80% strength; (6) a biceps endurance test, 40% strength; (7) a triceps

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power test; (8) a triceps endurance test, 72 contractions per minute; (9) a triceps endurance test, 36 contractions per minute; (10) a 100-yard dash; (11) a 300-yard dash; (12) a one-mile run; (13) a breath-holding test, normal conditions; and (14) a breath-holding test, 20mm. U-tube. In addition data were secured for Age, Height, Weight, sports experience, and the Bernreuter Dominance-Submissive inventory. Items 1, 4, 7, and 10 were so selected as to facilitate neutralization of the factors of power or speed. Items 3, 6, 9, 12, and 14 were so devised as to demand greater persistence despite discomfort than would be needed for good performance in items 2, 5, 8, 11, and 13.

Primary conclusions derived from the first procedure: In general, men are able to maintain both the speed and the coordination of movement in small muscle groups despite the consciousness and the external symptoms of general body fatigue. Attitudes do affect and even determine performance. The effects of general body fatigue upon the speed and coordination of finger and arm muscles do not manifest themselves at a definite point in performance nor increase in force at a uniform rate. Further attempts to establish the occurrence of persistence by this means were therefore considered inadvisable.

Primary conclusions derived from the second test group: Subjects were unanimously aware of three aspects of performance: (1) the sensations of discomfort and inattention which arise early during fatiguing activity; (2) the sudden awareness of decreased performance; and (3) the ability to regain and even improve performance by conscious concentration of effort. No single individual performance consistently followed in detail the traditional fatigue patterns of warm-up, maximum efficiency, and progressive work decrement.

Primary conclusions derived from the third test group: The relationships between performances in

small muscle activities which involve different muscle groups and different skills and rhythms are of a very low order. The relationships between performances in small muscle activities which are apparently identical in their skills but differ in power or rhythm are relatively high. The low correlations obtained between persistence scores are at variance with those of previous studies of persistence in which  $r$ 's of a consistently higher order have been secured between performances in markedly dissimilar tests but are consistent with the results obtained by workers in the field of simple motor skills.

General implications of the results and conclusions reached: Human performance in physically fatiguing natural activities does not follow the laws of fatigue as formulated by traditional laboratory procedures. Actual performance is specific to factors which are never static,--to the whole person and to the conditions under which performance occurs. The measurement of persistence is necessarily dependent upon such performance and is therefore equally specific. Controlled laboratory procedures involving human physical fatigue under conditions designed to secure objectivity and isolation of factors should be interpreted with great caution as to their direct significance for performance under natural life conditions. On the other hand, under normal life conditions, subjective factors are so effective and performance so inconsistent as to make measurement uncertain and acceptable research most difficult.

THE LEGAL BASIS OF THE SOCIAL STUDIES  
IN MICHIGAN, 1787-1948

(Publication No. 1108)\*

Howard Kingsbury Holland, Ph.D.  
University of Michigan, 1949

The Problem. The purpose of this study was to trace the legal basis of the social studies in the State of Michigan from 1787 to 1948. This involved three steps: 1) to show wherein lay the fundamental authority over the social studies, which are part of the total course of study or curriculum of the Michigan schools; 2) to trace the historical disposition of this authority; and 3) to trace the history of precise social study requirements which had to be met by schools and their teachers.

Procedure in the Solution of the Problem. The data used in this study were derived from (1) Territorial and Session laws of Michigan; (2) judicial decisions relating to authority over education in general and the curriculum in particular; (3) legislative journals; (4) annual reports and directives of Superintendents of Public Instruction; and (5) educational reports and writings.

The first phase of the problem was handled by showing where the United States Constitution, the three Constitutions of Michigan, and various judicial decisions placed the fundamental authority over the curriculum of Michigan schools.

The second phase indicated the disposition of authority over the social studies by showing where the Legislature placed such authority and where it

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was exercised extra-legally.

The third phase was one of determining course prescriptions from an examination of directives issued by persons or state-wide bodies having the right to specify courses for Michigan schools.

Conclusions. 1. Authority over the curriculum resides in the several states. Michigan has recognized this and provided for control of instruction through legislative enactments and through the powers given to the Superintendents of Public Instruction.

2. The trend from 1829 was to increase the power of the Superintendent to control courses of study. In 1913 the authority was made definite in that all public schools other than those in cities were directed to follow the State course of study.

3. In 1933 the conception of the method of State control of the curriculum changed so that localities were encouraged to formulate their own courses of study.

4. None of the social studies were prescribed before 1861. However, even in Territorial days the Legislature indicated the social studies subjects in which teachers must be proficient.

5. From 1861 to 1933 the State prescriptions show: 1) an increasing amount of social studies in the curriculum; 2) an effort to make courses in history and civil government meet growing requirements for citizenship and patriotic education; 3) the effects of professional and non-professional pressure groups in shaping the objectives and content of social studies courses.

6. From 1933 to 1948 State Superintendents made no prescriptions relating to social studies. Instead, they endeavored to stimulate local groups to make social studies the core of local curriculums.

A STUDY OF THE EDUCATIONAL PERFORMANCE  
OF RETURNED VETERANS ADMITTED TO COLLEGE  
THROUGH THE SERVICEMEN'S INSTITUTE AT  
MICHIGAN STATE COLLEGE

(Publication No. 1112)\*

Ross Wattam Matteson, Ph. D.  
University of Michigan, 1949

The Problem. This study involved two phases. First, a prognostic phase attempted to determine what factors, in this group, tended to differentiate the successful from the unsuccessful students. Second, an evaluative phase attempted to determine the efficacy of the refresher training program in helping these veterans to be successful in college.

The Procedure. For the 287 veterans who, lacking certain requisites for entering college, had been assigned to the refresher program for the fall quarter of 1946, items of pre-college, service, entrance, S.M.I., and college data were collected, coded, and analyzed.

Zero-order and multiple correlation coefficients of college achievement and such quantitative variables as high school marks, test scores, age, and number of entrance units were computed to determine those factors appearing to be significantly related to the academic success of the group. Through the use of regression coefficients, adjusted achievement scores were obtained, eliminating the effect of certain factors found to be significantly related to the criteria. The analysis of variance technique was applied to test the extent of variation among curricular and other groups.

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Significances of differences between means of various groupings were tested.

For the evaluative phase of the study, sixty-eight students, as a control group, were matched with a like number from the main experimental group. Subsequent academic achievement and survival in college of the two groups were compared.

Conclusions. (1) A majority of students of the type considered do not continue in college beyond a year and their survival appears to be significantly related to their achievement in college.

(2) Previous academic grades and achievement test scores are significantly related to the college success of students in this type of selected group.

(3) Recommendations and ratings of students by their high school principals merit consideration as predictors of college success and survival.

(4) Students who enter college by examination and who have subject deficiencies appear to be definitely handicapped.

(5) Factors involving personal adjustment, such as motivation and study habits may operate to increase the probability of college success of students who lack certain traditional requisites for admission.

(6) Vocabulary and reading comprehension appear to be significant determining factors in college survival.

(7) Students who have had refresher training not only achieve somewhat higher grade averages than equivalent students going directly into college level work, but also they tend to remain in college longer.

## A COMPARATIVE STUDY OF ACCIDENT-REPEATERS AND ACCIDENT-FREE PUPILS

(Publication No. 1124)\*

Sidney Bernard Birnbach, Ed.D.  
New York University, 1948

### THE PROBLEM

The major objective of this research is to determine and compare the psycho-physical qualities of the accident-repeater and the accident-free pupil.

### INTERPRETATION OF THE PROBLEM

This study entailed the examination of two groups of pupils. In the first group were those who have had a record of repeated accidents. In the second group were those who qualified as being free from accidents. The investigation was directed toward bringing forth information of a psycho-physical nature for each pupil in the study. The data from test scores and school records were statistically treated for the purpose of noting significant differences between the groups. The availability of such information should be helpful in identifying the accident personality that might be present in a school child. It should assist accident preventionists in bringing about adjustments that would lead to safe behavior.

### PROCEDURE - Research Procedure

One hundred and three pupils from Hawthorne Junior High School of Yonkers were selected for the study. The selection of this school was made for the following reasons:

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1. This school was the largest junior high school in the city, having a total of six hundred male pupils. The pupils were drawn from a wide area and represented a cross section of the socio-economic levels of the city.<sup>1</sup>

2. As physical director of the school, it was possible for the investigator to have close contact with the pupils in the investigation. As a member of the faculty, a high degree of cooperation was assured the investigator, with school records and school time made available for the conduct of this investigation.

The pupils were selected only after very careful screening which entailed examination of school accident and medical records as well as through personal interview. Of these pupils, forty-eight exhausted the school population for those who were accident free<sup>2</sup> as did fifty-five pupils who were selected as accident repeaters.<sup>3</sup> These pupils were tested with tests of strength, physical fitness, knowledge of safety, gymnastics, and for personal adjustment in the areas of health, home, social and emotional. In addition, the health, medical, and scholastic record of each pupil was examined and important information gained.

The pupils were tested in the school in their customary classes. The program was administered

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1. This information was obtained from the census map of the City of Yonkers which indicated the average monthly rentals for each tract on the map.
2. The accident-free were those who never had an accident that resulted in a serious injury to the extent that they had to be confined to the home or hospital and resulted in lost time from school.
3. The repeater group was comprised of those who have had a minimum of five accidents which resulted in a serious injury and which confined them to the home or hospital with a loss of time from school.

by the writer to ensure consistency and accuracy. From test results and from information secured through the school records, a master chart was constructed. This chart contained information relative to forty-three variables describing each pupil in the study.

#### STATISTICAL PROCEDURE

This study dealt with two groups of individuals--the accident-free and accident-repeated groups--with the purpose of studying selected psycho-physical traits to determine the relative value in describing these two groups. The result of which should prove helpful in identifying the accident personality.

Statistical procedures on group analysis were used in describing the traits and their significance. These were as follows: Means and standard deviations have been calculated for each of the traits, and the standard error of the difference between means has been extracted to determine the statistical significance of the means. Bi-serial correlations have also been calculated between each of the various psycho-physical traits of the accident-free and accident groups. In order to determine the combined influence of the several significant variables, the multiple correlation, grouping significant traits, have also been extracted to determine the influence on a correlational basis.

#### ANALYSIS OF RESULTS

This investigation has brought forth the following comparisons in the traits studied for those in the accident-free and accident-repeater groups.

1. In the test<sup>4</sup> for adjustment, the free group indicated better home, health, and emotional adjustment, with little difference existing between the groups for social adjustment. The most significant contrast was seen for

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4. Hughe M. Bell, *Adjustment Inventory*, Stanford University Press.

emotional adjustment which indicated maladjustment for 40 per cent of the repeater group and 29.2 per cent for the free group.

	Accident Free Group	Accident Repeat Group	Critical Ratio
	MEAN*	MEAN*	
Home Adjustment	5.37	7.96	2.27
Health Adjustment	5.81	7.58	2.27
Social Adjustment	12.87	12.75	.09
Emotional Adjustment	6.60	9.35	2.36

\* A lower mean for the Adjustment Inventory indicates a better score.

2. In the measurement of strength<sup>5</sup>, the repeater group indicated superiority over the free group. The most significant differences existing for leg strength, pushups, strength index and for physical fitness index.

	MEAN	MEAN*	
Leg Strength	544.47	693.46	3.20
Pushup	3.29	4.80	2.96
Strength Index	1181.79	1436.12	3.30
P. F. I.	.77	.90	3.43

\* Higher mean indicates a better score for strength tests.

3. In gymnastic skills as revealed by test<sup>6</sup> results, the repeater group indicated from 16 to 26 per cent greater skill in four of the five phases of the test. The most significant difference was for climbing, in which area the repeaters were greatly superior. The smallest difference existed for balance stunts, the free group having slight superiority.

5. Rogers, F. R., *Physical Capacity Tests*, Bureau of Pub., Teachers College, 1926.

6. New York State Physical Fitness Standards, State Education Department, New York State.

	Accident Free	Accident Repeat	Critical Ratio
	MEAN	MEAN	
Climbing	1.14	1.67	3.81
Vaulting	1.50	1.87	2.87
Body Supports	1.02	1.47	3.48
Tumbling	1.17	1.51	2.63
Balances	1.55	1.45	.62

4. The testing of the pupils for their knowledge of safety<sup>7</sup> revealed 41.3 per cent failing among the repeaters as compared to none failing among the free. Of the forty-three variables compared, that of safety knowledge stands out as the most significant in describing the groups.

	MEAN	MEAN	
Knowledge of Safety	62.69	52.91	7.76

5. Upon analyzing statistically, the ratings given by teachers relative to the pupils growth in personal and social relationships, it was found that the free group indicated a higher degree of dependability, cooperation, and were more courteous and industrious than the repeaters.

	MEAN	MEAN	
Cooperative	2.19	2.00	1.93
Courteous	2.19	1.98	2.57
Dependable	2.23	1.78	4.22
Industrious	2.35	1.71	4.96

6. On studying the physical defects<sup>8</sup> that existed among pupils of both groups, it was found that 19.0 per cent among the free group and 43.7 per cent among the

7. National Safety Education test for Junior High School, Center for Safety Education, New York University.

8. The physical defects that were studied were those of vision, hearing and of an orthopedic nature.

repeaters had one or more defects. Furthermore, 6.2 per cent of the free had defective hearing to 12.6 per cent of the repeaters. For vision, 4.2 per cent of the free had defective vision to that of 16.4 per cent of the repeaters.

	Accident Free	Accident Repeat	Critical Ratio
	MEAN	MEAN	
Physical Defects	.27	.64	2.44

7. A multiple correlation analysis was made of those test items that stood out as being highly descriptive of either group. From these the seven most significant were extracted and an overall multiple correlation study made.

**MULTIPLE CORRELATIONS OF COMBINATIONS OF OVERALL  
SIGNIFICANT VARIABLES**

	Climb.	Indus.	Health Adj.	Emot. Adj.	Strength Ind.	Phy. Defects	Safety Knowl.	Criterion
1. Climb.								
2. Indus.	-.26							
3. Health Adj.	-.14	-.25						
4. Emot. Adj.	.19	-.37	.34					
5. Strength Index	.34	-.25	.06	.18				
6. Phy. Defects	.00	-.11	.15	.07	.12			
7. Safety Knowl.	-.14	-.45	-.11	-.19	-.11	-.23		
8. Crite- rion	.35	-.45	-.24	-.23	.31	-.24	-.60	

R. 1234567 = .71

The negative (-) sign indicated a superior rating for the accident-free group.

## CONCLUSIONS

1. Children who are well adjusted emotionally and in the area of the home have fewer accidents.
2. Possessing adequate safety knowledge is an accident deterrent providing the individual does not suffer from any serious personality maladjustments or serious physical defects.
3. Intelligence as a factor is not to be regarded as an important requisite in accident prevention.
4. When thwarted, the typical defenses of the repeater is his attempt to dominate by physical means, recklessness, bravado and evasion. These are his springboards to accidents. This conclusion was drawn from personal observation of the investigator, from reports by teachers present at the scene of accidents and from case histories drawn from information given by students and parents.
5. Accidents are produced usually as the result of a combination of factors rather than any one factor.<sup>9</sup>

## RECOMMENDATIONS

1. In order to reduce the number of pupils who are developing the accident habit, largely due to personality maladjustments; school systems should accept greater responsibility for the adjustment of their pupils by providing increased psychiatric and social services.
2. Schools should provide additional facilities that will serve to develop wholesome habits for the release of emotional tension.
3. Any attempt to cope with the accident repeater,

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9. This was indicated by the results of multiple correlation analysis made of significant traits. This showed the combinations of traits that described the accident repeater, such as maladjustments in the area of the home and in emotions plus that of lack of industry, dependability as an example.

in order to be effective, must deal with his fundamental problems in the area of his greatest sensitivity.

4. Parents and teachers should be alert to recognize the personality syndrome of the repeater. This can be seen by studying the habitual manner in which he attempts to solve his conflicts.

5. The correction of physical defects particularly those of hearing and of vision would go far in reducing a child's susceptibility towards accidents.

6. Safety instruction for children should be an active responsibility of the schools.

7. Extensive research should be conducted in the physical, emotional, and environment factors that result in accidents to children in particular and in emotional maladjustment in general.

8. In administering to the child whose emotional maladjustment is leading him into accident situations, it is well to check on the emotions of the adults in the child's environment.

A COMPARATIVE STUDY OF PERSONAL ADJUSTMENT PROBLEMS OF BRETHREN YOUNG PEOPLE IN SUMMER CAMPS AND CERTAIN NON-BRETHREN YOUNG PEOPLE

(Publication No. 1125)\*

Abram Stauffer Curry, Ph.D.  
New York University, 1948

An attempt was made to discover the nature and intensity of the problems of adjustment of young people fifteen to twenty-four years of age who have been brought up under the traditional teachings of certain Protestant groups, particularly the Church of the Brethren, against (1) card playing, (2) dancing, (3) attending movies, (4) participating in the armed forces of the nation, (5) smoking, (6) drinking, (7) "going with" a Catholic, (8) petting, (9) marrying a divorcee, and (10) discriminating against Negroes. To some extent the traditions and mores of these groups studied are in opposition to, or different from, the traditions and mores of the larger society in which these groups are set down. The study was undertaken to discover if there are significant differences in adjustment factors which operate in the personalities of youth of the Church of the Brethren and those factors found in youth representative of certain interdenominational groups. An attempt was made also to discover if adjustment problems differed between Brethren boys and girls, Brethren rural and urban youth, and among Brethren high-school, post-high-school, and older

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\* Microfilm copy of complete manuscript of 445 pages, \$5.57.  
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youth. Differences were measured in these same groups in home, health, social, and emotional adjustment as measured by the Bell Inventory.

A total of 565 Brethren youth from Brethren youth camps in Pennsylvania, Virginia, and Indiana were studied, along with a total of 388 youth of many different denominations in interdenominational youth camps, sponsored directly or indirectly by the International Council of Religious Education, and located in New Hampshire, Pennsylvania, and Tennessee. The Bell Inventory and a questionnaire prepared by the investigator were the instruments administered in each of the nine summer camps. Multiple-choice questions regarding each of ten teachings enumerated above were included to discover the attitudes of parents, associates of youth, the churches which youth attended, and youth themselves toward the teachings; also there were questions to discover the extent of personal problems and "confusion" about the teachings, the sources and extent of help received on the problems, the extent of participation in the disapproved practices, and the extent of subsequent guilt feelings. A self-rating scale on each teaching was used to discover the severity of each problem.

There were found to be no significant differences between Brethren and Interchurch youth on home, health, and emotional adjustment on the Bell Inventory; a significant difference was found in social adjustment, the Brethren youth appearing less well adjusted in this respect. The significant difference was arrived at statistically by using the ratio of the difference between the means to the standard error of this difference. In compiling the data of the questionnaire, the method of determining the ratio between the difference and the standard error of the difference between two percentages was also used.

In general, Brethren youth experienced more adjustment problems related to the teachings against card playing, dancing, attending movies, and serving

in the armed forces. There seems to be little difference in the prevalence of adjustment problems between the two groups in relation to the teachings on smoking, drinking, going with a Catholic, marrying a divorcee, and associating with Negroes, although Brethren youth seem to experience slightly more difficulty in adjustment to each of them. Only on the teaching against petting do Interchurch youth seem to experience more problems than Brethren youth. Petting, dancing, and movies are greater problems to Brethren girls than boys; teachings against armed service, drinking, and smoking are associated with greater problems for Brethren boys than girls; little difference in adjustment problems obtained between Brethren rural and urban youth. Some slight, but relatively inconclusive, differences in adjustment difficulties were noted among Brethren high-school, post-high-school and older youth.

The research throws light upon certain aspects of the relationship of religion and mental hygiene in yielding quantitative data on the nature and prevalence of adjustment problems related to these ten disapproved practices. It indicates a need for a study of ways of eliminating or resolving adjustment problems related to church teachings on social practices.

AN EVALUATION OF THE ESTABLISHED REGULATIONS EMPLOYED BY THE STATES TO ENSURE THE HEALTH AND SAFETY OF VARSITY COMPETITORS IN SECONDARY SCHOOLS

(Publication No. 1126)\*

Charles Gorman De Shaw, Ed.D.  
New York University, 1948

Inasmuch as interscholastic athletics have been accepted generally as a vital aspect of the school program and are expanding in content and direction, this study of the controls placed by states upon secondary schools to insure the health and safety of varsity competitors is significant. The establishment of adequate and comparable regulations is necessary owing to this expansion of the program, the possible differences in the provision of adequate safety measures because of local financial conditions and educational philosophies concerning athletics, and the growing scarcity of trained leadership. As controls by state athletic associations are not sufficient, state regulations by state boards of education are necessary. The evaluation of the regulations of state boards of education and state athletic associations and the advancement of policies for states to consider for legislation is the purpose of this study.

The regulations of three state boards of education, the only ones that issued such directives, and defined as "official" bodies, and of forty-five state athletic associations, defined as "quasi-official" bodies, were secured by letter. These directives were broken down into categories of "administrative," "program,"

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"player," and "equipment and facilities" according to established specifications. A list of 79 items was compiled, using the judgment of specialists in health and physical education, and was submitted to a panel of four experts in each of the areas of physical education, health education, school health, and safety education for evaluation. Their appraisals classified 58 items as "essential," 19 items as "recommended," and 2 as "optional." Standards for state controls on varsity athletics were thus obtained although only "essential" items were used in formulating the policies.

The matching of these standards against the existent regulations revealed, (a) that too few states have explicit controls covering enough of the items, (b) that official bodies are largely concerned with administrative controls, and (c) that quasi-official bodies are largely concerned with eligibility of players. More specifically, official bodies are concerned with the following items:

1. The coach as a member of the faculty.
2. The designation of varsity athletics as part of the physical education program.
3. Compulsory physical examinations for varsity competitors.

Quasi-official bodies tend to deal with the following items:

1. The coach as a member of the faculty.
2. Compulsory physical examinations for varsity competitors.
3. Competition with secondary schools only.
4. Age, legal residence, number of years of competition, grade in school, participation on outside teams, and amateur status of players.

From this study, policies which embrace the fundamental structures of a sound health and safety program are advances for state legislatures to incorporate into school codes. These policies are placed

under headings similar to the regulations. The administrative control policies provide for the following aspects:

1. A school doctor to permit or deny participation to a student.
2. Adequate financial support by the school for athletics.
3. Transportation to and from games away from home.
4. Sufficient adequately trained coaches for each sport.
5. Accident insurance.
6. Limitation of games with secondary schools only.
7. Immediate care of injured players.

The program control policies provide for the following aspects:

1. Education of students and adults concerning the educational objectives of athletics.
2. Teaching of safety on the athletic field.
3. Length and duration of a sports season.
4. Athletics as part of the physical education program.

The player control policies provide for the following aspects:

1. Minimum age levels for competition.
2. Limitation of student participation in one school year.

Equipment and facility controls provide for the following aspects:

1. Laying out of facilities.
2. Frequent inspection of facilities and equipment.
3. Provision of sufficient properly fitted personal equipment.

The study indicates that administrative, program, and equipment and facility controls are not adequate and that states are allowing state athletic associations

to sponsor the program. The report recommends, (a) that states examine their athletic policies in terms of best educational practices and make necessary adjustments, (b) that states join in setting up a national body to standardize controls, and (c) that states examine their methods of allocating funds to secondary schools so that these institutions may adequately finance their entire programs, to include varsity athletics.

## INSTITUTIONAL INTEGRATION IN COLLEGIATE SCHOOLS OF NURSING

(Publication No. 1128)\*

Marguerite Cecelia Holmes, Ed. D.  
New York University, 1948

This study concerns the determination and evaluation of current practices of institutional integration in collegiate schools of nursing, with suggestions and recommendations for developing techniques and policies of integration that may be helpful to administrators of collegiate schools of nursing.

The organization of the material of this investigation has involved the presentation of findings concerning the integration techniques in effect in ten selected collegiate schools of nursing. Although the study was concerned with institutional integration in collegiate schools of nursing in general, it was limited to a detailed investigation of the ten selected schools.

The criteria formulated and used for the selection of the schools of nursing to be studied were based on adequate representation of the major geographic regions of the country and on their accreditation by active membership in the Association of Collegiate Schools of Nursing.

A visit was made to each school of nursing co-operating in the study. This visit supplemented the questionnaire which was sent in advance of the personal visit.

The questionnaire was sent to the directors of eight collegiate schools of nursing apart from the schools invited to cooperate in the study. These

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eight schools were selected to include schools having active membership in the Association of Collegiate Schools of Nursing, associate membership in the Association of Collegiate Schools of Nursing, and schools in which the director had indicated interest in the study. The directors were asked to answer the questionnaire and return it with any criticisms or comments. There were no criticisms made and this was the questionnaire used in the study.

After the visits to the ten schools of nursing co-operating in the study had been made and the questionnaires returned, all data were analyzed and evaluated. As a result of this analysis and evaluation, a list of fifty integrating techniques was formulated. This list was sent to a jury composed of ten administrators of collegiate schools of nursing. The members of this jury, who had not cooperated in any other way in this study, were asked to evaluate each of the techniques submitted.

The integrating techniques that constitute the conclusions drawn from the study are based upon the seventy-five per cent acceptance by the jury of ten. Thirty-one integrating policies and techniques were selected, and some of these are:

The school of nursing shall be an autonomous school or department within the educational institution and shall have the same status as similar units within the college or university.

The school of nursing shall establish aims including its responsibility to society, to the student, and to the profession of nursing.

The curriculum shall be planned on the basis of the stated aims of the school which have incorporated the major aims of the college or university.

The source of income for the support of the school of nursing shall include income from endowments, general college funds, and contributions.

Income shall be controlled by the educational institution and there shall be a separate budget for

the school of nursing.

There shall be a coordinating council composed of representatives of the educational institution, the school of nursing, and the participating agencies.

Definite channels of communication shall be established between the educational institution and the participating agencies.

The educational institution shall assume responsibility for the selection of the participating agencies in which the students receive their nursing practice and shall control the educational and clinical experiences afforded the students while in the agencies.

The educational institution shall be responsible for financial compensation to staff members of the participating agencies for the time devoted to the nursing education program.

There shall be formally prepared contracts between the educational institution and the participating agencies. The contracts shall be for a specified period of time and shall be signed by authoritative persons of both institutions.

Additional recommendations for further study in this field, based on this study, include a comparative study of curricula; studies of educational programs, faculty, standing committees, financial factors; and a study of the interests and needs of the nursing school graduate.

**CAMPING EDUCATION: A BOOK DEALING WITH  
THE EDUCATIONAL ASPECTS OF CAMPING**

(Publication No. 1129)\*

**Frank Lewis Irwin, Ed.D.  
New York University, 1948**

The book, **CAMPING EDUCATION**, deals with the educational aspects of organized camping. It is written primarily for camp directors, camp counselors, public-school administrators, teachers, and college students. Its purpose is to provide them with a comprehensive view of the educational aspects of organized camping, an understanding of the part camping can play in achieving the goals or aims of American education, and an acquaintance with the specific methods by which camping can be utilized to achieve these goals or aims.

The field of organized camping has grown from a movement consisting of three camps in 1885 to one that today comprises over six thousand camps and serves over one and one-half million children annually. The American Camping Association which represents the big majority of these camps has as its stated purpose, "To further the interests and welfare of children and adults through camping as an educative and recreative experience."<sup>1</sup> Prominent American educators including William H. Kilpatrick, Boyd H. Bode, and John W. Studebaker have examined the educational offerings and possibilities of organized camp-

1. American Camping Association, The A.C.A. -- What is it? 343 South Dearborn St., Chicago, Illinois, 1948, p. 1.

\* Microfilm copy of complete manuscript of 270 pages, \$3.38. Enlargements 6" x 8", 10¢ per page. Library of Congress Card Number Mic A 48-338.

ing experiences for all children. Educational organizations such as The American Association of School Administrators, The Association for Supervision and Curriculum Development, and The American Association for Health, Physical Education, and Recreation have set forth statements in reports or yearbooks recommending camping and outdoor education for all children. A number of public-school systems including Battle Creek, Michigan, San Diego, California, and New York City have experimented with organized camping and have found it to be educationally significant.

In spite of the wide recognition of the educational nature of organized camping, the literature pertaining to this aspect of camping is sketchy, widely scattered, and unrelated. In the writing of the book, **CAMPING EDUCATION**, the author has drawn together material dealing with organized camping and education and has presented it in a form suitable for use by camp directors and counselors, school administrators and teachers, and college students studying in the field of education. Topics treated are as follows:

**Historical Background of the Organized Camping Movement**

**Organized Camping Today**

**Need for Camping Experiences in Twentieth Century Education**

**How Organized Camping Meets the Educational Needs of Modern Children**

**Understanding the Child**

**Group Life in Camp**

**The Organized Camp Program**

**Training and Supervising Counselors**

**Camp Administration**

**Organized Camping as a Part of the Educational Program of a Public-School System.**

As a foundation for the book -- a standard by which the educational value of the various aspects of the organized camping program could be determined,

the writer utilized the list of aims or goals for American education compiled by the Educational Policies Commission of the National Education Association.

To secure a substantial body of facts relating to camping and education the writer read an extensive number of selected books, bulletins, pamphlets, leaflets, magazine articles, and research studies. He obtained from a random selection of private camp directors, over two hundred catalogs and/or miscellaneous material which described their camps and camp programs. He visited the national headquarters of the major organizations operating camps and obtained from them information regarding the purpose of their various camping programs and the extent of their camping efforts. As a source of additional information and as an aid in organizing and interpreting the material collected by the above procedure, the writer utilized his previous experience as a camper, counselor, camp director, college student studying in the field of education, public-school teacher, and investigator in the field of organized camping.

As a check on the handling of the subject matter a jury consisting of five educators was selected. This jury examined the presented subject material and approved its pertinence or relevancy to the stated objectives of American education.

Camp directors and counselors will find in the book many suggestions for guiding and strengthening the educational aspect of their own camping programs. Public-school administrators and teachers contemplating the establishment of a program of camping and outdoor education as a part of their school's curriculum will find in the writer's treatment of camping education much useful information pertaining to this problem. And teachers of college courses in camping and outdoor education will find the book with its "Recommended Readings" and "Related Questions" suitable for use as a text or reference book.

## A HANDBOOK FOR DIRECTORS OF HIGH SCHOOL ORCHESTRAS

(Publication No. 1130)\*

Albert Anthony Renna, Ed.D.  
New York University, 1948

### The Problem

The problem was to write a handbook for the use of high school orchestra directors. The aim of the writer was to prepare a guide for both the experienced and the inexperienced director in carrying out their responsibilities to instrumental groups and in carrying out their recognized duty to communities. Moreover, should school administrators as well as all music teachers realize more fully the part the orchestra can play in school and community life as a result of reading this book, the writer would have realized his complete objective.

### History of the High School Orchestra

Before the twentieth century, singing completely dominated the music program in the public schools. It was only after music had become firmly established in this country on a cultural basis in the large cities that instrumental music found a place as an extra-curricular activity in high schools. The present pattern of instrumental instruction began to appear about 1916.

Certain events helped establish the high school orchestra on a more permanent basis:

(1) the organization of the first National High School Orchestra as part of the Music Supervisors

\* Microfilm copy of complete manuscript of 106 pages, \$1.33. Enlargements 6" x 8", 10¢ per page. Library of Congress Card Number Mic A 48-339.

National Conference in 1926;

- (2) the appearance of a National High School Orchestra at the 1927 meeting of the Department of Superintendence of the National Education Association in Dallas;
- (3) the establishment of the National Music Camp at Interlochen, Michigan in 1929; and
- (4) the performances of the groups in the first national school orchestra contest in 1929.

The cultural, social and vocational values of the orchestra are now thought to be valid reasons for appropriating time and money for its development.

#### Organizing a High School Orchestra

Administrative co-operation and aid are necessary in the ideal method of organizing and developing an orchestra. Regardless of its size, it should be a well-balanced ensemble which plays artistically.

The classification and admission of student players constantly challenges the director; there is no one set of criteria that will serve as a certain guide.

#### Activities of the High School Orchestra

An orchestra rehearses and it performs. In rehearsals, time is saved when activities become routinized. It is a public performance that makes the hours of practice seem worthwhile to students.

Student committees perform invaluable services and gain invaluable experience in helping arrange and in carrying out the many details of a performance.

Many factors contribute to developing an orchestra to its potential excellence: good student spirit, constant attention to intonation, sectional rehearsals, care in selection of music, student officers, and periodic evaluation of students' ability and progress.

#### Management of the High School Orchestra

Adequate housing for the orchestra and its activities is a basic consideration.

A well-planned program of public relations results

not only in better financial support of the orchestra but makes it possible for it to better serve the community. A Students' Artist Bureau is an effective medium through which such services can be channeled. Learning to write news releases and maintaining friendly relations with local professional musicians and the musician's union are responsibilities of the director.

#### The Director of the High School Orchestra

The most important factor in the development of an orchestra is the director. He must be a musician, a teacher and an administrator. His training can be defined only in terms of accomplishment and experience. Since there are hundreds of individuals responsible for directing high school orchestras who have not had an adequate basic training for their duties, an extensive in-service training program is necessary. This program must be planned with persons competent to evaluate an individual's skills and previous experiences.

#### Recommendations

In order that the high school orchestra can be developed, it is recommended that

- (1) the elementary school music program be planned so as to prepare children for subsequent participation in the high school orchestra, and
- (2) teacher-training institutions take cognizance of the multiplicity of activities in which a director must engage and plan curricula to train him in all phases of his future work.

A SURVEY OF THE SOCIAL STUDIES COURSES OF  
STUDY IN NEW YORK STATE COLLEGES AND  
UNIVERSITIES

(Publication No. 1132)\*

Dorothy Margaret Torpey, Ed.D.  
New York University, 1948

The social studies courses of study offered by institutions of higher learning constitute a most essential part of our American educational program. Nevertheless, comparatively little has been recorded concerning basic characteristics of such social studies courses. In order to obtain pertinent data with respect to these characteristics, a survey of the social studies courses of study offered during the academic year September 1944 - June 1945 was made in selected colleges and universities.

Social studies, as the term has been applied in this survey, refers to a field of study which includes courses of history, economics, geography, government, and sociology. The courses included in this survey were restricted to content courses on the undergraduate level offered by institutions of higher learning in the State of New York having membership in the Association of American Universities and Colleges and having a minimum enrollment of five hundred students. Application of such criteria resulted in a total of nineteen colleges and universities representing a cross section of institutions of higher learning in the state.

To acquire primary data, with respect to current offerings during the period under consideration, an original series of one hundred three different check-

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\* Microfilm copy of complete manuscript of 230 pages, \$2.88  
Enlargements 6" x 8", 10¢ per page. Library of Congress  
Card Number Mic A48-341.

lists was constructed. Checklist topics were based upon elements of content which appeared with the greatest frequency in similar courses and in college textbooks in the field. Each checklist also provided for the insertion of additional elements by instructors. Instructors were requested to indicate the degree of stress ("dominant," "important," "minor" or "insignificant") accorded to each topic within an individual course. Where only one institution offered a particular course and where the course description was inadequate the instructor was encouraged to list his own topics on an optional checklist.

A total of nine hundred five individual checklists was sent to the nineteen institutions. Personal interviews and follow-up letters supplemented the original letters to college presidents soliciting their cooperation. Seven hundred sixty-seven checklists were returned.

Analysis of the data acquired through the survey suggests the following conclusions:

Of the total number of different courses offered in the social studies field, the two phases receiving the greatest emphasis are history and economics and the two phases receiving the least emphasis are geography and government.

Of the total number of courses offered, the two phases having the greatest number of offerings are history and sociology and the two phases having the smallest number of offerings are government and geography.

The scope or content of the individual courses and the related emphasis upon specific topics within a course vary greatly.

Although many curriculum content variations have been made from time to time, the colleges surveyed have been slow in changing their content pattern and direction.

Students are offered a wide choice in the selection

of courses in the social studies field.

The terms "social studies" and "social sciences" are utilized with varied meanings. There is an apparent hesitancy on the part of colleges and universities to apply these terms to courses in history, economics, geography, government, and sociology.

The social studies courses surveyed are offered by a variety of college departments.

Careful consideration of the total offerings in the social studies field prompts the author to conclude that every student should be required to study each of the five phases of the social studies for at least one semester. Individual study of all five phases is believed necessary in order to develop a person who will possess a well-rounded personality and who will have the ability to cope with the problems of life intelligently as they appear.

**A DETERMINATION OF THE PRINCIPLES AND  
EXPERIMENTS DESIRABLE FOR A HIGH-SCHOOL  
COURSE OF INTEGRATED PHYSICAL SCIENCE**

**(Publication No. 1139)\***

**Vaden Willis Miles, Ph.D.  
University of Michigan, 1948**

**Statement of the Problem**

The purpose of this investigation is (1) to determine the relative importance of the principles of physical science which are desirable for inclusion in an integrated course of physical science for senior high school; and (2) to determine the relative values of the experiments which are desirable for inclusion in such a course, and whether each of those experiments would more appropriately be done as a laboratory experiment or as a demonstration.

**Methods Used**

Five specialists in the teaching of science evaluated Wise's 272 principles with respect to whether each was essential, desirable, or undesirable for inclusion in the course. Numerical values were assigned to each of the degrees of desirability, and the principles were arranged in descending order of the sums of these values.

Seventy-three appropriate sources were analyzed for experiments, and the experiments were assigned to principles. Four specialists evaluated on a five-point scale the degree to which each experiment is suitable for inclusion in the course and contributes to

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\* Microfilm copy of complete manuscript of 436 pages, \$5.45.  
Enlargements 6" x 8", 10¢ per page. Library of Congress  
Card Number Mic A 48-348.

the development of an understanding of the principle; and indicated whether each would more appropriately be done as a laboratory experiment or as a demonstration, or would be equally appropriate for performance by either method. The experiments for each principle were arranged in order of their relative values for development of an understanding of the principle. The method of performance preferred was indicated.

### Findings

#### Findings Table I.

Two hundred fourteen principles were given positive values for inclusion in the course. Forty were deemed essential by all judges. Of the 103 which ranked highest, 72 are physics, 25 chemistry, and 6 geology.

#### Findings Table II.

1. Seven of 25 principles which had no experiments were deemed essential by all judges.
2. An average of 2.78 highly values experiments was assigned to each of the 103 highest ranking principles.
3. Of the 286 experiments assigned to these principles and judged to be ideally or well suited, 159, or 55.6 per cent, were deemed to be more appropriately done as demonstrations than as laboratory experiments; 84, or 29.4 per cent, as laboratory experiments; and 43, or 15.0 per cent, as equally appropriate by either method.

### Conclusions

1. There is an abundant number of principles well suited for inclusion in an integrated course of physical science.
2. There is an abundance of experiments suitable for developing understandings of most of the principles, and for most of these principles there is a

considerable choice of such experiments.

3. The fact that about two-thirds of the "important" principles were from the field of physics (including astronomy and meteorology); one-fourth from chemistry; and one-tenth from geology emphasizes the difficulty of providing a course which is well balanced among the different fields of the physical sciences.

4. The teacher has available an ample selection of experiments for use either as demonstrations or as laboratory experiments.

5. Many experiments not well suited to the inductive development of understandings of principles might prove of great value in the teaching of scientific method and attitudes.

6. Experiments suitable for the inductive development of understandings of principles for which there were no experiments should be devised.

MORAL FREEDOM AND THE EDUCATIVE PROCESS,  
A STUDY IN THE EDUCATIONAL PHILOSOPHY OF  
WILLIAM TORREY HARRIS

(Publication No. 1143)\*

John Robert Arscott, Ph.D.  
New York University, 1948

The Problem

The purpose of this study was to analyze the writings of William Torrey Harris in order to determine the nature of his doctrine of moral freedom, the role of that doctrine in his philosophy, and its relation to his educational theories.

Procedure

The following steps were involved in this study:

- 1) The philosophical background was examined in order to determine the intellectual setting in which Harris's ideas developed.
- 2) Since the doctrine of moral freedom is Harris's answer to the free will question, it was necessary to analyze his treatment of free will in terms of its psychological and metaphysical aspects.
- 3) Harris's doctrine of moral freedom was considered in terms of its educational implications.
- 4) The relationship between Harris's doctrine of moral freedom and democracy was discussed.
- 5) Harris's views on the nature and implications of moral freedom were compared with those of John Dewey.

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\* Microfilm copy of complete manuscript of 201 pages, \$2.52.  
Enlargements 6" x 8", 10¢ per page. Library of Congress  
Card Number Mic A 48-352.

### Summary of Findings

Study of the historical background reveals (a) Harris's central role in the St. Louis movement in philosophy, (b) his criticisms of Emersonian transcendentalism and Herbert Spencer's naturalism and (c) his reliance upon Hegelianism.

Three factors of Harris's doctrine of moral freedom are given particular attention: spontaneity, alternative choice, and direction. By spontaneity Harris means that the self is a creative agent with the capacity for making choices and exercising self-determination. In this interpretation a transcendental, timeless self objectifies itself in the temporal order of events. The possibility of alternative choice he conceives as a necessary condition but not the full fruition of moral freedom. The salient characteristic of moral freedom is his belief that moral freedom means rational self-determination: the self finds true freedom through appreciation of and identification with the rationality embodied in institutions.

Analysis of Harris's discussions on (a) freedom versus fate, (b) the three views of the world--atheism, pantheism, and theism, and (c) efficient and final causation delineates the metaphysical aspects of his doctrine of moral freedom.

One educational implication of Harris's doctrine of Harris's doctrine of moral freedom is his encouragement of self-activity to the end that the student should develop a social sensitivity and an enduring sense of personal responsibility. The school's function in the individual's attainment of moral freedom, over and above the limited efficacy of will training through disciplinary procedures, becomes that of making his social and religious heritage a living reality. The individual through education is to be brought into a gradual appreciation of the underlying rationality of existence. He interprets education as a "universalizing" process in which the individual transcending

egocentric motives progressively achieves true self-hood in an ever-increasing radius of social and spiritual interests.

A chapter on moral freedom and democracy notes a tendency of Hegelianism towards uncritical acceptance of existing social practices. Harris's advocacy of unrestricted laissez faire is illustrative of this tendency.

Comparison of Harris's and Dewey's views disclosed the following points of agreement: the concept of indifferent choice is educationally meaningless; consciousness of the grounds of choice is the indispensable basis for intelligent behavior; moral growth occurs only through self-activity; the problem of morality is to develop a self which voluntarily seeks those goods which simultaneously enrich both the individual and society; the democratic way of life permits the maximum individual self-realization compatible with the well-being of all.

Fundamental differences between Harris's and Dewey's position include Dewey's denial of the transcendental self, his rejection of Harris's rational, a priori psychology, and his repudiation of Harris's belief that individual self-determination has meaning only in the light of a completely self-determined being. In place of an absolutism with "theistic knowing" as the organ of truth, Dewey proposes a humanism centered in the scientific method.

For Harris the entire curriculum was spiritual in essence. Since each part embodied something of the spiritual entirety, its presentation as a part of the whole would, he believed, serve to release the creative capacities of the growing self. Comparison of Harris's and Dewey's ideas on the curriculum showed that Harris over-emphasized the traditional, classical approach.

### Conclusions

Viewing one of his chief philosophical tasks to be

that of repudiating mechanistic, materialistic, and fatalistic views of the universe, Harris identifies himself with the idealistic tradition--culminating in Hegelianism--which, in his opinion, furnished the only satisfactory ground for teleology and freedom. Harris thus becomes the disciple of a great tradition rather than an original thinker.

The doctrine of moral freedom reflects his Hegelian orientation. By means of this doctrine he attempted to mediate between educational extremes such as external compulsion and uncharted spontaneity. He argued that the individual will voluntarily conform to the institution which he understands, for institutions are the embodiment of rationality.

The positive features of this idea have been amplified in this study. Attention has also been drawn to the undue conservatism or complacency which may result from emphasis on conformity or adjustment to, rather than continuous reconstruction of, the institution in terms of immediate and anticipated needs.

## A COURSE IN SEX EDUCATION AND MARRIAGE PREPARATION AT THE HIGHER-EDUCATION LEVEL

(Publication No. 1144)\*

Forrest Sidney Hamilton, Ed. D.  
New York University, 1948

The study consists of (1) conducting a survey of higher education courses in the area of sex education and marriage preparation, (2) evaluating these courses in terms of the opinions of students, psychiatrists and recommended writers in the subject field and (3) the presenting of an outline for a course in sex education and marriage at the college level.

The major problems of this study are (1) to determine the content of courses in sex education and marriage as currently offered by colleges and universities in the United States, (2) secure the opinions of psychiatrists as to course contents which would recognize existing needs, (3) survey the recommended writings of authorities in the area of marriage counseling and psychiatry for the purpose of determining which factors they recognize as being important in marital stability and happiness, (4) secure data reporting on student knowledge and opinions in the area of sex and marriage and (5) evaluate the courses in terms of the opinions and recommendations of psychiatrists, writers, and students, and recognizing the aforementioned sources, present an outline for a course in sex education and marriage at the college level.

The study was initiated by mailing questionnaires to a sample of 55 institutions recommended as offering good courses in the subject area; 49 or approx-

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\* Microfilm copy of complete manuscript of 289 pages, \$3.62.  
Enlargements 6" x 8", 10¢ per page. Library of Congress  
Card Number Mic A 48-353.

imately 87 per cent of the institutions participated in the study. These data are reported in the study.

Fifty books were suggested by various sources and a random sample of twenty-one were analyzed. Each book was examined for the purpose of determining which areas were considered by the writers as being fundamental through their presentation as chapter headings. Then each chapter was examined in detail in an attempt to obtain information as to which factors are recognized by sociologists, psychiatrists and psychologists as being of value in assisting individuals to prepare better for marital happiness and stability. Such frequently recognized factors would be those considered important in the curriculum of a course in sex education and marriage preparation.

In order to obtain the opinions of professional workers who deal largely with those individuals incompatible in their emotional and marital adjustments, it was decided to seek information from practicing psychiatrists. A questionnaire was mailed to a group of those specialists in Texas and to others throughout the United States. Thirty psychiatrists and neuro-psychiatrists thus participated in the study.

Twenty-five classes in the School of Education at North Texas State College at Denton were selected at random, and a questionnaire relative to sex and marriage was administered to this sampled group. A total of 822 students participated in the study.

As a result of the aforementioned surveys and an analysis of publications, a number of conclusions appear to be warranted by this investigation. From the conclusions drawn these facts are most evident:

1. The institutions as a whole are ignoring the problems of stress in sex education and physiology of the reproductive organs.
2. The majority of institutions are not recognizing areas which psychiatrists believe to be of importance.
3. There is not much agreement among the

various writers reviewed as to emphasis upon specific problems.

4. The participating college students reveal definite lack of knowledge in the field of sex education and marriage preparation.

An outline which would embrace an adequate course in marriage preparation and sex education should recognize the following topics:

1. Physiology and anatomy of the reproductive organs.
2. Menstruation.
3. The sex drive.
4. Venereal diseases.
5. The courtship period.
6. The engagement period.
7. Psychological factors in marital adjustments.
8. Sexual side of marriage.
9. Planned parenthood.
10. Emotional factors in marital adjustment.
11. Sterility and frigidity.
12. Economics of marriage.
13. The climacteric.
14. Child difficulties.
15. Divorce.
16. Pedagogy of sex education.

AN ANALYSIS OF SELECTED GUIDANCE ACTIVITIES  
WITH RECOMMENDATIONS FOR HOUSING THEM IN  
LARGE PUBLIC SCHOOL SYSTEMS

(Publication No. 1148)\*

Joy Benjamin Munson, Ph. D.  
Michigan State College, 1948

Definition and Limitation of the Problem.

The determination of (1) what are guidance activities and (2) how these activities should be housed in the school plants of large school systems were the two major concerns of this study.

A large school system was interpreted to be a school system in a city of from 20,000 to 200,000 population. The study included both elementary school and secondary school activities and facilities for guidance.

Need for and Importance of the Study.

Evidence exists that guidance has become a recognized school activity. The importance of the school plant in limiting or expediting school programs is increasingly apparent. It is imperative that new or remodeled facilities be wisely planned if adequate educational programs are to be provided. If guidance facilities are necessary, they, too, must be wisely planned. A tremendous need exists over the country for new and remodeled school facilities. While adequate standards are available for the planning of most school units, little has been published concerning standards for physical facilities for guidance services.

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\* Microfilm copy of complete manuscript of 208 pages, \$2.60.  
Enlargements 6" x 8", 10? per page. Library of Congress  
Card Number Mic A48-357.

### Methods and Procedures Employed in the Study.

Survey appraisal procedures were used in the early phases of the study in which an attempt was made to find out what activities were provided in guidance programs in representative cities. Few physical facilities for guidance were found in cities thus appraised. Obviously, an inventory of even the best existing practice was inadequate for the purposes of this study. Existing practice may be, and probably is in many cases, bad practice. A statistical inventory of present practice would only tend to perpetuate such practice.

Bibliographical and summarizing techniques of research were employed in an attempt to discover a consensus of authoritative published opinion concerning the guidance activities that should be found in an ideal program.

The problem became basically a normative-survey type of study when a questionnaire instrument was developed to survey directly the opinions of authorities in the field of guidance. The purpose of the questionnaire was necessarily twofold: first, it represented an additional effort to determine what guidance activities should be provided in large school systems and, second, what physical facilities are necessary to house them.

### The Questionnaire; Procedures and Returns.

The questionnaire formed a comprehensive, printed booklet of nine pages. It was mailed to all of the known state supervisors of guidance. The opinions of the state supervisors of guidance were expected to be representative of the opinions of guidance specialists in general. Since there is little chance of guidance activities being developed in a school system unless the administrator favors the program, and since it was pertinent to discover

whether there was any great discrepancy between the guidance beliefs of school administrators and guidance specialists, the opinions of school administrators in large school systems were sampled. Because there were over 500 schools in the population limits set for this study (according to the U. S. Office of Education Educational Directory), a sampling was made of the opinions of the school administrators in every fifth city within the classification.

A total of 42 questionnaires were mailed to state supervisors of guidance, and 102 questionnaires were sent to school administrators selected at random. The state supervisors returned 38 questionnaires for a 90.5 per cent return. Returns came from 65, or approximately 64 per cent of the school administrators. The total tabulated return was 71.5 per cent. The returns represented 46 states. State supervisor returns came from 38 states and school administrator returns came from 35 states.

The questionnaires were very well filled out with 92 per cent of the respondents answering all of the questions on a junior high school level and 95 per cent of them answering all of the questions on the senior high school level.

#### General Summary and Conclusions.

Although it was reasonable to expect decided differences in opinion concerning guidance between guidance and administrative personnel, there was surprising unanimity of opinion.

The activities that were regarded by the authorities as responsibilities of the guidance program are ranked below in terms of the per cent of the authorities who listed them. Because the results from the two groups of authorities were so similar, only the totals for both groups are given:

Counseling and Interviewing	100
Case Study	100
Gathering Vocational Information	100

Gathering Educational Information	100
Follow-up	100
Orientation Programs	98
Educational and Vocational Guidance	
Units in the Curriculum	97
Developing and Maintaining Cumulative Records	91
Placement	94
Test Administration and Interpretation	91
Organized Group Guidance Activities	87
Student Council	82
School Publications	81
Clubs	80
Parties and Dances	76
Special Education Activities	74
Cooperative Work Experience Programs	73
Health Services	51

The first five activities listed above were unanimously accepted as guidance activities. The next ten were accepted as necessary to the guidance program by better than three-fourths of the authorities, and it was suggested that, unless they are otherwise regularly supervised administratively, the guidance program should assume definite responsibility for their coordination. The last three were listed as contributing much to guidance, though there was some question as to whether or not they should be classed as guidance functions. Guidance personnel should take an active interest in these activities and should cooperate with designated personnel to encourage their greatest utility. Certain recommendations were made for the organization of all of the above activities at each grade level.

The specific physical facilities recommended by the authorities are ranked below in terms of the per cent of authorities who favored them. Certain features or standards relating to the location of the

guidance facilities are included:

Private Interviewing Rooms	100
Individual or Clinical Testing Facilities	99
Occupational Information File	98
Health Rooms	95
Clerical Facilities	94
Special Social Rooms	92
Reception Room	87
Nearness to Central Office	87
Nearness to Library	77
Centralized Location	76
Social Atmosphere	76
Location on First Floor	68
Group Testing Facilities	54
Recreational Facilities	32

Certain special features of an individual counseling or interviewing room were recommended:

Desk and Chair	99
Filing Cabinet	94
Book Shelf	89
Wall Pictures	89
Two or More Extra Chairs	88
Bulletin Board	76
Rugs	76

It was recommended that an average of one hour per pupil per year of counseling time be provided at the junior high school level with a median number of 100 pupils per counselor. This would require one individual counseling room for each 600 pupils or fraction thereof. An average of one and one-half hours per pupil per year of counseling time was recommended for the senior high school level with a median of 100 pupils per counselor. This would require one individual counseling room for each 400 pupils or fraction thereof.

The recommendations were translated into four suggested floor plans for new or remodeled schools. The facilities recommended for each grade level were, finally, summarized in Check Lists for Planning Physical Facilities for Guidance in Large Public School Systems.

A PROFESSIONAL CURRICULUM IN HEALTH AND  
PHYSICAL EDUCATION FOR THE STATE TEACHERS  
COLLEGE AT NEW HAVEN, CONNECTICUT

(Publication No. 1152)\*

Charles Augustus Bucher, Ed. D.  
New York University, 1948

### The Problem

Since becoming a member of the staff of the State Teachers College at New Haven, Connecticut, the writer has recognized the need for a professional curriculum at this institution which would adequately prepare prospective teachers of health and physical education for the public schools of the State of Connecticut. The major program was established in September, 1946, and since that time a curriculum has been followed which was hurriedly drawn up for temporary use. Therefore, the purpose of this study has been to develop a professional curriculum based on the local and state influences which affect the teacher education curriculum at New Haven State Teachers College, the current developments in teacher education in general and in the preparation of teachers of health and physical education, and the professional standards in teacher education for this specialized field.

### Procedure

Data pertinent to this study were determined through a documentary survey of professional literature, reports of administrative officers, reports of

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\* Microfilm copy of complete manuscript of 310 pages, \$3.88.  
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committees and commissions; interviews with key personnel; and the questionnaire method.

The data relative to the local and state influences, current developments in teacher education, and professional standards which affect the teacher education curriculum at the New Haven State Teachers College, were examined and reviewed under appropriate divisions. Statements of facts which had implications for this study were then determined from the findings. Through the interview and/or correspondence technique, both the standards and curriculum established were evaluated by a jury of experts representing various areas of learning.

### Results

The proposed four-year teacher education curriculum in health and physical education for New Haven State Teachers College should provide that prospective teachers meet entrance requirements in respect to scholarship, intelligence, oral and written English, physical health, personality, interest in teaching as a profession, and motor ability.

Those students who successfully meet the entrance requirements should pursue a curriculum consisting of 128 semester hours of study including work in the academic, foundational science, professional education, and health and physical education areas of learning. In order to insure that each prospective teacher receives the preparation that is best suited to his needs, it is necessary to recognize that the requirements prescribed in the proposed curriculum be flexible to the extent that individual differences are taken into consideration. A blanket requirement cannot be listed for all students. A prospective teacher's capacity, educational background and interests should be given careful consideration before his program is prescribed. Furthermore, the student should participate in the evaluation of his record and

help in planning the prescribed work.

In general it can be said that the average or normal allotment for each of the four general areas of learning should include: 32 to 48 semester hours in the academic area to be distributed among the fields of English, fine and practical arts, social sciences and mathematics; 22 to 26 semester hours in the foundational science area to be distributed among the physical and biological sciences; 22 to 31 semester hours in the professional education area to be distributed among courses dealing with orientation, child growth and development, evaluation, student teaching, methodology and seminar; and 39 to 45 semester hours in the specialized area to be distributed among courses in health education and physical education.

#### Conclusions

As a result of this study certain conclusions may be made:

(1) Care must be taken in the recruitment and selection of individuals interested in the health and physical education profession, if the preparation outlined in the proposed curriculum is to be effective.

(2) The curriculum should provide for a broad cultural background, a mastery of subject matter and skills, an understanding of child growth and development, and competency in professional techniques and methods.

(3) The curriculum must be flexible to the extent that individual differences are taken into consideration so that teachers of health and physical education will emerge as well-rounded individuals who are competent to guide the daily activities of children in the public schools of the State of Connecticut.

(4) A five-year program of preparation should be instituted as soon as possible for the training of prospective teachers of health and physical education.

(5) Health Education and Physical Education, instead of being combined into one specialized field, should be separated and each constitute a major program in itself.

(6) A general education background is needed for the teacher of health and physical education, in order that this profession may increase its prestige and fulfill its potentialities in the educational process.

A STUDY OF THE INTELLIGENCE, ACHIEVEMENT,  
AND EMOTIONAL ADJUSTMENT OF CRIPPLED  
CHILDREN IN AN ORTHOPEDIC HOSPITAL SCHOOL

(Publication No. 1154)\*

Anthony Francis Donofrio, Ph. D.  
New York University, 1948

The intelligence, school achievement, and emotional adjustment of 270 crippled children in an orthopedic hospital school were studied for the two-fold purpose of comparing the above factors in crippled children with:

1. the same factors in the "normal" population, and
2. the following conditions of crippling: type, severity, duration, length of institutionalization, and a cumulative measure of disability and duration from onset.

Most of the earlier studies were concerned with intelligence and found the mean I.Q.'s to be in the eighties. There is a dearth of experimental data on school achievement and emotional adjustment.

In this study, one group of 157 children (Group A) was tested from 1940 to 1943 and another numbering 113 (Group B) toward the end of 1946. They ranged in age from five to sixteen. Group A was given the Stanford-Binet (Form L) and the Brown Personality Inventory; Group B the Kuhlmann-Anderson, Brown Personality Inventory, Thorndike-McCall Reading Ability Test, Woody-McCall Mixed Fundamentals, and three subtests of The Stanford Achievement (social

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studies, literature, and elementary science). Teachers' ratings on general adjustment were secured for both groups. An orthopedist assisted in classifying severity into five categories (from unobservable or slight crippling to complete or near complete disability), and in developing a method of weighting the orthopedic ordeals of each child from the date of onset, the cumulative weight being designated the disability-duration index (DD). Types of crippling were classified into seven categories and a miscellaneous group. Intelligence, achievement, and emotional adjustment were compared to the normal population by calculating the means of the test results. The effects of severity, duration, type, disability-duration, length of stay, and chronological age upon intelligence, achievement and emotional adjustment were ascertained by the linear correlational technique and comparison of the mean performance of extreme groups when numbers permitted.

The results show that the average intelligence of these children falls within the normal range with the distribution skewed toward the left. The CNS involvement group, as in other studies, obtained the lowest mean I.Q. No significant differences were found among the other types. There were no significant correlations between intelligence and duration, DD, length of stay, etc.

School achievement fared rather favorably with normal children when age-grade placement data were analyzed. The mean E.Q. of seventy pupils, however, was only eighty-seven; the A.Q. approximately 100. As with intelligence, no statistically significant relationships were found with the several variables of crippling condition.

The mean percentile ranking for 177 children on the Brown Personality Inventory fell within the range of normality. Emotional adjustment had no statistically significant relationship to intelligence, duration, length of stay, and DD. There was, however,

a noticeable trend toward better adjustment with increasing age. Qualitative analysis of responses reveals that home adjustment is good. The lack of substantial correspondence between teachers' ratings and inventory classifications can be attributed to lack of definitiveness in the rating schema.

The following results were also noteworthy: between A.Q. and I.Q., A.Q. and DD, severity and I.Q., and severity and favorable emotional adjustment, there were inverse trends; between duration and A.Q., and DD and A.Q. the trends were direct.

Length of stay showed negligible correlations with I.Q., emotional adjustment and educational achievement (E.Q.).

The value of the DD technique lies in the continuity and completeness of the medical records and in close orthopedic assistance. Precision in this study suffered somewhat from a lack of continuity and completeness in the records. Ideally the orthopedist would undertake directly the detailed weighting of disability and duration.

## A HISTORY OF GAMMON THEOLOGICAL SEMINARY

(Publication No. 1155)\*

Prince Albert Taylor, Jr., Ed.D.  
New York University, 1948

In A History of Gammon Theological Seminary, the writer has outlined the founding, the rise and the growth of Gammon from its very earliest years as a department of Clark University (1883-1888) to the present day. The rise of higher education of Negroes was briefly sketched in order to show the importance of the theological education of the Negro clergyman. The relatively higher position of the clergyman among his people was advanced as a special reason for the support of higher theological education of the Negro clergy. The story is told of how the Reverend Elijah E. Gammon became interested in the higher education of freedmen, of his necessary withdrawal from active Christian ministry, his accumulation of wealth in business and his desire to use his money in furtherance of his interest in Negro education. The selection of the Reverend Wilbur P. Thirkield as the head of the Theology Department of Clark University and later as the first President of the separately organized Gammon Theological Seminary is briefly narrated and explained. Development of the School's program, the gathering of its students, the building of the faculty and the gradual expansion of its facilities is described. The various periods of the Institution's growth are set forth in a description of the contributions that were made during the administrations of

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the several presidents. Finally, the process of receiving accreditation by the American Association of Theological Schools and thereby becoming one of only two accredited theological schools devoted largely to the preparation of Negro ministers. In the story of Gammon Theological Seminary the investigator finds evidence of a successful achievement, particularly in the types of service rendered and in the distinction achieved by its alumni in the field of religion particularly in religious leadership and in positions of influence in higher education.

The author has further made definite recommendations for the improvement of the work in the future, such as the employment of younger men in professorial chairs; efforts at closer cooperation with well recognized colleges for the recruiting of its students; the revision of the program to meet modern needs of Negro churches; an expansion of the program and the provision for the handling of a larger number of students and to decrease per-capita cost; a still further expansion of in-service training; more comprehensive race-relations courses; and a closer affiliation with the Atlanta University system. It is further recommended that more attention be given to improving the physical equipment of the Seminary itself.

Attention was called to the fact that in its organization, Gammon Theological Seminary has always been inter-racial even though its attention has been centered upon the higher theological education of Negroes. There have been both Negro and White presidents and Negro and White faculty members. Because of the location in the deep South there have been no white students but there have been increasingly helpful cooperative relationships with White institutions through various inter-institutional gatherings.

It is the author's conclusion that this oldest Methodist theological seminary for Negroes has still a function of great usefulness in the theological education of the Negro people.

AN EXPERIMENTAL STUDY OF SAMPLING PROCEDURES FOR THE DETERMINATION OF ACHIEVEMENT TEST NORMS IN A CITY SCHOOL SYSTEM

(Publication No. 1163)\*

Joseph Wilmer Menge, Ph.D.  
University of Michigan, 1949

The purpose of this study was to determine, among several different methods of selecting a sample of pupils from a given population, which method gives results most closely representing the total population. The variable chosen for the investigation was score on the Stanford Reading Test. The test was administered to 237 class groups of 8th grade pupils in 97 different schools--a total of 7724 pupils. Four different types of sampling plans were then used in drawing samples from this population for which complete data had been secured. The four basic plans, all of which involved selection of groups of pupils rather than individual pupils, were: (a) simple random selection of school groups, (b) stratified random selection of school groups, (c) simple random selection of class groups, and (d) stratified random selection of class groups. Three different patterns of stratification (i.e., specified arrangements of schools or classes in sub-groups before selecting a sample) were used with both schools and classes.

The standard error of the mean score was used as the measure of "representativeness" of a sample. Reliabilities of means for samples drawn by the different plans were determined by two independent methods: (a) estimation of standard errors from

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distributions of means secured by repeated sampling, and (b) computation of "true" standard errors using the cluster formula--i.e., the error formula applicable to samples obtained by selecting groups rather than separate individuals.

Samples of classes stratified by both geographic location and by size of class membership, simultaneously, were found to represent the total pupil population more accurately than samples drawn by any of the other methods used.

The standard deviation of the 7724 scores was 9.05. The desired level of accuracy for a test norm (sample mean) was defined as a standard error of the sample mean not to exceed one-twentieth of the standard deviation of individual scores (i.e., .45). This level of accuracy was achieved with a stratified sample of 50 schools (about 4000 pupils). For a stratified sample of 80 classes (about 2500 pupils), the standard error of the mean was smaller than .45. Had the population been sampled by drawing individual pupils from it, at random, the desired level of accuracy could have been achieved with a sample of approximately 360 pupils.

In spite of the relatively large numbers of pupils required, sampling by schools or classes would be more practical than sampling by individual pupils. It is possible to exercise complete control over the method of selecting the schools or classes to be tested. The accuracy of obtained results will therefore be measurable. It would be extremely difficult and expensive to exercise complete control over the method of selecting and testing a sample of individual pupils in a large school system. Procedures used in (a) setting up plans for selecting samples and (b) analyzing data obtained from the samples, show that the accuracy of results secured by using the school or the class as the sampling unit may be determined objectively and precisely.

THE THEORY AND PRACTICE OF SENIOR HIGH  
SCHOOL ADMINISTRATION IN TWELVE CITIES OF  
MICHIGAN, OHIO, AND INDIANA

(Publication No. 1165)\*

Winston Leigh Roesch, Ph.D.  
University of Michigan, 1949

The purpose of the study was to develop principles of senior high school administration which express the functional point of view and to determine the extent that the principles were accomplished in practice. To obtain measures of desirability and practicability, the principles were submitted by questionnaire to fifty-four secondary school principals in Michigan, Ohio, and Indiana. For opinions concerning the degree the principles were practiced, professional personnel in twelve senior high schools located in Group II cities of Ohio, Michigan, and Indiana were interviewed. In addition, the school visitor judged the extent of practice in the twelve schools. Finally, certain underlying community factors, that affected the attainment of theory in the schools visited, were analyzed.

Each principle was scored higher on desirability than on practicability by the secondary school principals who completed the questionnaire. The difference, by the average of scores, was 30 per cent points of desirability, with a range of 7.2 to 56.2 per cent for the eighteen principles.

In the opinion of the school visitor, five of the principles were judged as practiced to a moderate degree, and thirteen to a limited degree. The school

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principals rated accomplishment higher (14.3 per cent) than other professional personnel interviewed; and all professional personnel interviewed rated accomplishment higher (26.1 per cent) than the school visitor.

The investigation indicated that ability of communities to support reasonable increases in school costs existed; but that the communities, generally, were unwilling to pay the additional costs. A basic factor underlying the refusal of community adults to make additional payments was the lack of adult understanding and appreciation of the purposes, conditions, values, and needs of the senior high school. The facilitating activity of interpreting the school to the community did not meet school and community needs, judged by the opinions of parents interviewed and an evaluation of the current programs of interpretation in the twelve schools.

Certain recommendations for improvement of the organization and operation of the senior high school are summarized in the concluding chapter. The recommendations relate to curriculum, school plant, textbooks and instructional supplies, cooperative planning, individual differences, attendance of students, equality of individual opportunity, personnel, and adjustive services.

AN ANALYSIS OF SELECTED OPINIONS ON THE  
SELECTION AND RELATIONSHIP OF MEMBERS OF  
STATE BOARDS OF EDUCATION AND CHIEF STATE  
SCHOOL OFFICERS

(Publication No. 1166)\*

Laiten Lester Camien, Ph. D.  
University of Kansas, 1948

An analysis of educational administrative literature revealed that an absence of statements of opinion of professional groups existed with reference to the problem of organization of state departments of education. Seven groups: (1) chief state school officers, (2) deans of schools and colleges of education in state universities and other similarly recognized institutions, (3) presidents of teachers colleges, (4) professors of school administration, (5) professors of education, (6) members of staffs of state departments, and (7) professors of political science were selected to be questioned. A questionnaire was designed to provide three choices for each respondent among the methods of selecting members for state boards of education, the several possible sizes of state boards of education, the methods of selecting chief state school officers, and the various relationships that may exist between this officer and the state board.

Invitations to participate in the questionnaire were sent to: (1) all persons in the first three classes listed above who were in office in 1945-1946, and (2) all persons, with certain limitations, in the remaining four classes if their names were found on

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the current (1946) membership lists of either the American Association of School Administrators, or the American Educational Research Association, or the American Political Science Association. Questionnaires were mailed to all who indicated their desire to become respondents. Of those distributed, 87.1 per cent or 571 were returned and used in the study.

Responses were tabulated and reported according to (a) groups, (b) aspects of state departmental organization, and (c) choices of respondents. Four composite groups: (1) all of the administrators, (2) all of the professors, (3) all of the educators, and (4) all of the respondents were used to supplement the seven professional groups named earlier. In addition, pluralities or majorities were accepted as indication of group approval for specific traits and as such they were reported.

There were pluralities among most groups which favored the following sorts of state department organization:

First Choice.-- The state board of education will consist of seven members who are appointed by the governor. The chief state school officer will be appointed by the state board of education and will serve the board only as its executive officer.

Second Choice.-- The state board of education will consist of seven members who are appointed by the state legislature. The chief state school officer will be appointed by the governor and will be an ex officio member of the board. Third Choice.-- The state board of education will consist of five to nine members and will be selected by popular vote. The chief state school officer will be appointed by the state legislature and will be also a member of the state board.

Some educational writers have used terms such as "unanimity," "consensus," "general agreement," and "in accordance with established principles" in support of certain plans of state departmental organization which they favored. This study shows that the use of such terms is unwarranted.

# EDUCATIONAL PSYCHOLOGY

## AN INVESTIGATION INTO THE PERSONALITY OF NORMAL DEAF ADOLESCENT GIRLS

(Publication No. 1156)\*

Edna Simon Levine, Ph. D.  
New York University, 1948

The object of this study is to investigate the mental and emotional aspects of personality of a selected group of normal deaf subjects in order to ascertain whether there are specific traits that characterize the personality configuration of these individuals; and, if so, what these traits are, and their implications in educational, psychological, guidance, and psychiatric endeavors with the deaf.

The incentive for this investigation was derived from the serious lack of information concerning the personality dynamics of the normal deaf members of society, a lack which imposes severe restrictions upon evaluating numerous phases of their behavior in various areas of human activity.

Two important factors are considered largely responsible for the present lack of such information: first, the scarcity of psychological tests which may be used effectively with the deaf; and, second, the marked heterogeneity existing among the deaf themselves.

In the present investigation, some three hundred pupils of an Oral-Residential school for the deaf were available for study purposes. In order to achieve a representative character and a degree of homogeneity in the final research group, ultimate selection of the subjects was based upon eight criteria items. Thirty-

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one pupils between the ages of fifteen and eighteen years were finally chosen who met the necessary requirements. In addition, a standardization group of one hundred hearing subjects of comparable age was used in certain phases of investigation.

The tests ultimately selected for this study were the Wechsler-Bellevue Intelligence Test and the Rorschach Test. Both were administered to each member of the research group in whatever method of communication was desired by the subject. Additional data were secured through: interviews with each subject, and with teachers, counsellors, and parents; observations of the subjects throughout the school day; cumulative school records and social histories; and, audiometric and achievement tests.

The Wechsler-Bellevue Test results were treated statistically and included comparisons of the various subtest scores with the mean level of group achievement as well as with the subtest scores of the standardization group. A specific pattern of performance of the research group was revealed, characterized by: a higher Performance Scale I.Q. than Verbal Scale I.Q.; and, sum of Object Assembly and Block Design higher than sum of Picture Completion and Digit Symbol.

The Rorschach Test results were evaluated through comparison with the established key relationships of Rorschach interpretation. These results confirmed the features of intellectual functioning derived from the Wechsler-Bellevue Test, namely: the low average order in the abstract spheres, non-creative and essentially reproductive, with diminished capacity for conceptual forms of thinking and with emphasis upon the concrete, perceptual forms. There was further revealed: a poverty of inner resources and lack of drive; reduced responsiveness to the outer environment as well as to inner promptings; constriction and inflexibility of personality; emotional affectivity of the immature, egocentric type, charac-

terized by easy irritability, impulsiveness and suggestibility. The group was found to be relatively free of Rorschach signs of anxiety, suspiciousness, and persecutory feelings.

In consideration of these results, it is concluded that the personality configuration of the research group is characterized by specific factors which are normal for these subjects based upon frequency of occurrence, but are not so for the hearing of comparable age. Further, despite their normalcy for the deaf subjects, it is evident that these factors do not possess optimal qualifications for effective life adjustments. Their implications present a concern and a challenge to the educator, the psychologist and the psychiatrist in planning for their possible correction.

# ENGINEERING

## A STUDY OF THE PLASTIC THEORY OF REINFORCED CONCRETE BEAM DESIGN AND THE EFFECT OF COMPRESSION STEEL IN REINFORCED CONCRETE BEAM

(Publication No. 1087)\*

Adil Belgin, Sc. D.  
University of Michigan, 1948

In this experimental study the following questions were answered:

- 1) What is the actual distribution of stress in a rectangular concrete beam near its ultimate strength when it is reinforced on both tension and compression sides, as compared to the same beam when reinforced on the tension side only?
- 2) What is the actual effectiveness of compression steel in a doubly reinforced rectangular concrete beam and how does this compare with the A.C.I. Building Code (A.C.I. 318-47) paragraph 706 (b)? It is quoted below:

"The effectiveness of compression reinforcement in resisting bending may be taken at twice the value indicated from the calculations assuming a straight line relation between stress and strain and the modular ratio given in Section 601, but not of greater value than the allowable stress in tension."

The results obtained in the investigation show that:

- 1) The stress distribution in reinforced concrete beams without compression steel is a horizontal

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parabola, the axis of which lies on the extreme fiber of the section when the extreme fiber stress reaches ultimate stress of the standard concrete test cylinder. In beams with compression steel, however, the action is complicated due to the presence of the compression steel. This is discussed in the text under the headings "Stress and Strain Distribution" and "Equilibrium Conditions of Resisting Moment and Bending Moment."

2) The A.C.I. Building Regulation A.C.I. (318-47) paragraph 706 (b) in regard to compression steel in flexural members should be changed to read as follows:

"The effectiveness of compression reinforcement in resisting bending may be taken at one and one-half times (instead of twice) the value indicated from the calculations assuming a straight line relation between stress and strain and the modular ratio given in Section 601, but not of greater value than the allowable stress in tension."

## HEAT TRANSFER AND PRESSURE DROP FOR SUPERHEATED STEAM FLOWING IN PLAIN AND MODIFIED ANNULI

(Publication No. 1106)\*

George Wheeler Govier, Sc.D.  
University of Michigan, 1949

Heat transfer coefficients and associated pressure drops are determined for superheated steam flowing in the plain and modified annuli formed between a 4.026-inch I. D. shell and a 1.500-inch O. D. tube, and three 1.500-inch O. D. tubes supporting extended surfaces of various types. The transfer section is 15.0 feet long in the case of the plain tube and 13.0 feet long for the various finned tubes. The Reynolds number of the steam is varied from 5,000 to 102,000 over the temperature range of 294°F. at two pressures of 50 and 100 psi. abs. Temperature differences between the heated inner tube and the steam vary from 30°F. to 160°F.

The gas phase heat transfer coefficients, based upon the total exposed surface, are found to range from 2.85 to 26.2. A simple graphical method is developed for separating these coefficients into their radiation and convection components. This method indicates that from 6.6 to 59 per cent of the total heat transfer is accomplished by radiation.

The radiation components of the heat transfer coefficients are also calculated from radiation theory, and the convection components obtained by difference. The validity of the method is established by the correlation of the convection data. The necessary

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absorptivities and emissivities of steam are obtained by extrapolating available data on the emissivity of water vapor in air by means of a theoretical equation. The extrapolated values are substantiated by the correlations of the data and by the good agreement between calculated values of the emissivity of steel and values recorded in the literature. In the modified annuli the rigorous application of fundamental radiation theory is hopelessly tedious for engineering purposes. It is shown, however, that these cases may be handled as plain annuli by considering the extended surface as equivalent to a bare surface of unit emissivity.

The convention heat transfer coefficients are analyzed and correlated by Dittus-Boelter type equations as follows:

$$\text{Bare Tube Annulus: } h = .0220 \frac{K}{D_v} \left( \frac{C_\mu}{K} \right)^{0.4} \left( \frac{D_v W}{\mu S_{\min}} \right)^{0.80}$$

$$\text{Longitudinal Fin Tube Annulus: } h = .0117 \frac{K}{D_v} \left( \frac{C_\mu}{K} \right)^{0.4} \left( \frac{D_v W}{\mu S_{\min}} \right)^{0.80}$$

$$\text{"Star" Fin Tube Annulus: } h = .0078 \frac{K}{D_v} \left( \frac{C_\mu}{K} \right)^{0.4} \left( \frac{D_v W}{\mu S_{\min}} \right)^{0.91}$$

$$\text{Helical Fin Tube Annulus: } h = .00494 \frac{K}{D_v} \left( \frac{C_\mu}{K} \right)^{0.4} \left( \frac{D_v W}{\mu S_{\min}} \right)^{0.91}$$

The pressure drop data are correlated in the conventional manner by the equations:

$$\text{Bare Tube Annulus: } f = 0.133 \left( \frac{D_v W}{\mu S_{\min}} \right)^{-0.16}$$

**Longitudinal Fin  
Tube Annulus:**  $f = 0.133 \left( \frac{D_v W}{\mu S_{min}} \right)^{-0.16}$

**"Star" Fin Tube  
Annulus:**  $f = 0.395$

**Helical Fin Tube  
Annulus:**  $f = 0.402 \left( \frac{D_v W}{\mu S_{min}} \right)^{-0.15}$

The convention heat transfer and the pressure drop data are interpreted to indicate the relative performance characteristics of the various types of surface.

## FORESTS AND FORESTRY

### THE APPLICATION OF ACCOUNTING THEORY TO THE FIELD OF INDUSTRIAL FOREST MANAGEMENT

(Publication No. 1115)\*

James Gregg Rowbury, Ph.D.  
University of Michigan, 1948

The growing of successive timber crops has become an important business activity for many companies in the wood products industries. As accounting generally is considered "the language of business," the success or failure of forestry enterprises will be judged by the use of accounting techniques.

The basic function of accounting is to serve top management personnel by providing concise summaries of pertinent financial statistics. Under present accounting methods, all timberlands which are managed for permanent production eventually will be recorded in the accounts at a mere nominal value which will approach zero. Any accounting report based on nominal values is practically useless as an aid to management in making fiscal decisions.

In order for the accounts to provide useful information pertaining to growing timberlands, provision must be made to record the growth or accretion on the books. As the standard period of accounting is one year, accretion should be recorded annually wherever possible.

Market value is the basic value for business purposes so that accretion should be recorded at the market value although this figure may have to be determined by indirect means. Several different methods of valuing accretion are discussed and the

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results of applying these methods to a sample stand are shown graphically.

Foresters have suggested that the book value of growing timber stands should be based on the estimated value of future yields discounted at a low rate. The high book value resulting from this method will indicate low earning rates in future periods and, as the earning rate is a very important index of financial success, this method is not recommended.

The major arguments against booking accretion are the desire to be conservative and the fear of increased taxes resulting from the recognition of true values. Sound accounting cannot and will not agree with the tax regulations in every detail so that accounts kept solely for tax purposes will lose most of their fundamental usefulness to management. Used as an argument for material understatement of asset values, the word "conservative" is a complete misnomer. Income is defined as the difference between revenue and the assets given up to produce that revenue. If the assets are recorded at absurdly low values, income will be correspondingly overstated. The overstatement of income is not a "conservative" policy.

If timber accounts are to be useful, they must be based on realistic values. In order to provide realistic values, the fact that trees grow must be recognized by recording the increase in value, or accretion, in the accounts.

**A REGIONAL ANALYSIS AND PLAN OF INTEGRATED  
MANAGEMENT FOR THE CUT-OVER UPLANDS OF  
SOUTHWEST LOUISIANA**

**(Publication No. 1119)\***

**Harry Miles Snyder, Ph.D.  
University of Michigan, 1948**

Southwest Louisiana has been a problem area for more than twenty years because of the territorial maladjustments created by intensive, rapid depletion of the timber resource. The Region was originally populated in the longleaf pine uplands by a heterogeneous mixture of peoples who migrated principally from the older southern states. A gradual infiltration of poor settlers into the pine flatwoods and hills continued after the Civil War to about 1880. Most of them were too poor to buy farms in the plantation belt of the Red River and they found a retreat in the submarginal pinelands. Their frontier way of existence prevailed with little change up to the end of the century.

Extensive railroad construction from 1880 to 1900 opened the Region internally to development by the lumber industry. The superb longleaf pine forest was harvested principally in the period of 1900 to 1930. Because of the uniform quality and size of the virgin timber, the stands were clear-cut, or nearly so, by power logging methods. A prosperous economic structure and greatly increased population were heavily dependent on the lumbering industry. The rapid decline of industry after 1920 severely reduced the economic base of the Region, and in the aftermath the

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social and financial ills were intensified by the depression of the thirties.

The marked failure of agriculture to supersede lumbering as the major industry in the Region was due chiefly to the low fertility of the upland soils. Until 1935, cut-over lands were sold to prospective farmers, causing further dislocation of the regional economy. Crop farming was generally uneconomic for small landowners who became increasingly dependent on the income derived from cattle grazed on the unfenced cut-over lands- the free range. Regional oil strikes in the period 1933-38 both helped and hindered the adjustment processes that were underway. Tax delinquency and reversion of cut-over lands were wiped out by the swift rise of oil speculation which "froze" the land ownership pattern and created additional land-use problems. The conflicts of land values and uses have been a drag on progressive land management to the present time and make natural obstacles arising from resource depletion even more difficult.

The Region suffers both from the limitations as well as the unknown potentialities of its available resources. Unity development of these resources under a system of integrated land management offers real prosperity for the area in future years. Cut-over lands now produce an annual land rent of \$0.24 from the grazing use which could be profitably combined with forestry. A program to stabilize the rural economy involves fundamentally planned land use according to soil capability. Both agricultural adjustment and improvement in land resources are needed. The present system of farming would be adjusted towards greater production of feed crops and increased acreages of permanent pastures to expand the beef cattle industry. Denuded lands would be reforested by planting to create new surface values in the form of forest capital. Forest grazing and timber growing would be a dual use of planted

lands which are submarginal for agriculture. Under proper applied management the joint returns in the first fifteen-year period would raise the income producing capacity of the land to \$1.75 per acre per year.

Integrated land management provides benefits to both the small and the large landowners, and full cooperative action can make the goal of regional prosperity a reality.

## GEOGRAPHY

# THE SHU TAO OR THE ROAD TO SZECHUAN: A STUDY OF THE DEVELOPMENT AND SIGNIFICANCE OF SHENSI-SZECHUAN ROAD COMMUNICATION IN WEST CHINA

(Publication No. 1122)\*

Herold Jacob Wiens, Ph.D.  
University of Michigan, 1949

When the Chinese Empire has been swept by civil turmoil in the past, Szechuan Province has been the last to stir itself in revolt; when the Imperial authority re-asserted itself in the pacification of the country, Szechuan was always the most stubborn in continuing defiance. This phenomenon has been attributed by one Chinese writer to the topographically isolated situation of this most important province of western China. Yet, throughout Chinese history this province isolated by rugged mountains has been most important economically and politically to the "Han Chinese" civilization centering first in North China and then in the lower Yangtse Chiang valley.

It is evident that the gateways of communication between the seat of the government and this isolated granary of empire were of strategic importance. Which are the principal gateways? What were their nature, roles, and importance during the historical evolution of the Chinese nation? What is the present and future significance of these routes to the modern Chinese state?

As late as 1872 the German geographer, Ferdinand von Richthofen, asserted that aside from the Yangtse Chiang, there was only one feasible and

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important route of communication between North China and Szechuan Province. This is the route known in its northern segment as the Linking-Cloud Route and in its southern segment as the Road of the Golden Oxen. While various alternate routes through the mountain belt were tried out during historical times, natural geographical factors eventually forced the primary channel of communication to follow the present route. Geographical factors limiting the choice of routes also made effective the creation of barrier fortifications for control of traffic along the routes, an important aspect of communications during historical times.

The development of road routes here originated in an early attempt to tap the resources of the Ch'eng-tu Plain, and this development in turn stimulated the growth of village and town settlements in the mountain belt. The pattern of such settlement development has been attributable in some measure to the nature of the means of transport used.

In the present, as in the past, the same geographical factors have operated, this time to fix the route of the motor highway and the probable route of the future railway. New engineering techniques for new forms of transport must overcome the old obstacles of terrain, while new problems of fuel and power for mechanical transport must be solved. In the solution of these problems, both the northwest and southwest in China offer special resources. Szechuan and Shensi both have coal to contribute. Kansu, Shensi and other northwest provinces have commercial possibilities in petroleum. Hydro-electric power can be feasibly developed south of the Ch'in-ling Shan water-divide.

The modernization which is coming about in transport and communications is a necessity which has both economic and political compulsions and it will bring about far-reaching improvements in commercial interchange and political stability, particularly in the northwest where the disturbing influence of Soviet Russia makes itself felt. In such improvements the Shu Tao or Road to Szechuan commands a key role.

## HISTORY

### LAISSEZ FAIRE AND THE GENERAL-WELFARE STATE IN AMERICAN THOUGHT, 1865-1901

(Publication No. 1102)\*

Sidney Fine, Ph.D.  
University of Michigan, 1948

In the period between 1865 and 1901 laissez faire was championed in America as never before and never since. Chief among its supporters were economists, Social Darwinists, businessmen, and practitioners of the law. Laissez faire economists identified self-interest with the general welfare and cautioned the state not to interfere with competition and the natural laws of the market. Social Darwinists, following the lead of Herbert Spencer, maintained that in the struggle for existence, natural selection causes the fittest to survive and that state intervention in this process invariably results in evil.

The businessman utilized the arguments of the classical economists and the Social Darwinists to explain and justify his dominant position, but he defended state activities that served his interests. A significant addition to the theory of laissez faire was made by Andrew Carnegie when he suggested that the rich administer their wealth in the public interest and thus do for the community what it might otherwise do for itself. The businessman's views were strongly supported by most Protestant clergymen.

In the courtroom, laissez faire was translated from theory into practice. By a broad interpretation of the due process clause of the Fourteenth Amendment and by a narrow interpretation of the police

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power of the states, lawyers and judges read their own laissez faire views into the fundamental law and in so doing materially reduced the ability of state governments to act on behalf of the general welfare. At the close of the century, legal formulae were also being devised to restrain the activities of the federal government.

Although strongly supported between 1865 and 1901, laissez faire was at the same time vigorously and successfully opposed. It was condemned as unethical and as lacking in scientific validity. The arguments on its behalf were declared to be inapplicable to the democratic state. Its critics, moreover, asserted that it is a dangerous policy to pursue in an industrial society.

The protest against laissez faire drew strength from various sources. Protestant leaders who emphasized the social aspects of Christianity attacked the ethical implications of laissez faire capitalism. New-school economists found fault with the basic premises of classical economics and emphasized the necessity for state intervention to make the system of private enterprise work effectively. Prominent sociologists criticized the central propositions of Social Darwinism and demonstrated the ability of society to interfere with social processes to its own advantage. Various political scientists showed that the state must violate the tenets of laissez faire if it is adequately to promote the general welfare. Laborers, farmers, and social reformers also repudiated the philosophy of the negative state.

From the social philosophy of some of the leading critics of laissez faire, there emerged the concept of the general-welfare state. Richard Ely, Lester Ward, and others proposed that the state take steps to improve social, economic, and cultural conditions. They believed that through positive action of this sort the state would be able to steer a middle course between the extremes of laissez faire and

socialism and to give substance to liberal ideals. During this period, Congress and the state legislatures did increase their activities on behalf of the general welfare; but it was in the liberal-reform movements of the twentieth century that the ideas of the advocates of the general-welfare state were to be realized.

THE SUBSIDIZATION OF BORDER PEOPLES  
AS A ROMAN POLICY IN IMPERIAL DEFENCE

(Publication No. 1105)\*

Colin Douglas Gordon, Ph.D.  
University of Michigan, 1948

It has been frequently noticed that as the Roman Empire aged and its armies became barbarized and weakened the state developed the policy of subsidizing its neighbors, buying off their attacks or purchasing their friendship. No effort, however, has hitherto been made to trace this aspect of Roman foreign policy in all its ramifications from its beginnings to its full development. This is the problem with which this dissertation deals.

The greater part of this work is a generally chronological discussion of all examples of subsidization which could be found. Some effort has been made also to achieve geographical unity by dealing with the eastern and northern frontiers separately under each emperor or period. There is a separate chapter on Justinian's handling of this policy and two final chapters discussing, firstly, the purposes of the subsidies and the causes of their rapid growth in size and frequency and, secondly, the effects of the subsidies on the empires and on those who received them.

It is suggested that subsidies originated in the custom of giving foreign ambassadors or princes handsome gifts as tokens of friendship. When, under Augustus, defence, rather than expansion, became the main tenet of Rome's foreign policy, it was soon

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found to be cheaper to pay small annual sums to the northern tribes, than to maintain large armies ready for any eventuality. New light is thus thrown on Domitian's famous payments to Decebalus, so harshly condemned by Tacitus and Pliny the Younger. It is concluded that Marcus Aurelius was the first ruler to be forced to pay subsidies in default of any other means of holding off the barbarians.

In the chaos of the third century subsidies were used as almost the sole means of defence, and consequently were vastly expanded, and even extended to the Asiatic frontiers. Under Diocletian and Constantine and their immediate successors, the imperial armies became strong and efficient, subsidization again played a subordinate, but never negligible, role, but under the later weaker governments they again became very important. This is particularly evident in the empire's dealings with Attila in the fifth century, and in Justinian's diplomatic defence against Persia and the tribes north of the Danube.

The effects of subsidies on external trade, on the state finances and on the army and defence generally are discussed. It is concluded that they stimulated trade, particularly with the north, that they were symptomatic of rather than a major cause of the army's decline, that, used in conjunction with a strong army, they were an efficient defence but otherwise a dangerous incentive to foreigners to attack, and that at times they created financial crises for the government. With regard to this last, however, it is maintained, despite Procopius' frequent remarks in his Secret History, that they were not an important factor in Justinian's financial difficulties. Lastly, the effects of subsidization on the barbarians are analyzed with the conclusion that the policy was one of the great civilizing forces on the northern tribes.

THE EVOLUTION OF THE MISSOURI MILITIA  
1804-1919

(Publication No. 1135)\*

John Glendower Westover, Ph.D.  
University of Missouri, 1948

The militia of Missouri has been an important element in the life of the state. Dating back to the Spanish period, it has been Missouri's main reliance in times of strife. As the state grew and changed so did the militia. There has been a constant evolution from the pioneer militiaman to the present National Guardsman.

In the early days when population was sparse and the Indian was the principal menace to the life of the pioneer, the militia included the total white adult male population, eighteen to forty-five. Training was not intensive and the arms of the militia were those of the citizen, but they were ordinarily sufficient to deal with the problems of the time. As the Indian moved from Missouri and there was no other threat to the peace of the state, the demand that the citizen should be relieved of militia service became strong. This led to the abolition of the compulsory military service and muster.

When the peacetime militia obligation became a voluntary one the social aspect of the institution was stressed. This recreational aspect of the militia was essential to hold the organization together. Interest in military drill was a factor in the organization of these uniformed companies, but it required strong inducements to get the men to stand the

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expense of maintaining their companies. When the social aspect of the militia was eliminated and the membership changed from upper-middle class to day laborers, actual state support was necessary if the militia was to be retained.

Throughout the history of the state, the General Assembly has expressed its belief in the importance of maintaining a strong militia by the passage of almost fifty general militia statutes. In part the legislature passed these to keep the militia abreast of the times, and partially because the state was continually experimenting with new forms which would bring an acceptable organization without necessitating any great expense. Avoidance of expense has been a cardinal principle in dealing with the militia. This was but a reflection of the legislative attitude in dealing with many other institutions of the state. It also represented the opinion by many people that there was no real need for a militia. An intense hatred of the militia formed by some during the Civil War, by others in labor organizations, and by the agrarians because of the alliance or supposed-alliance between the railroads, predatory interests and the militia also made it impossible to get adequate state financial support.

When the National Guard, the cumulation of the militia system in Missouri, became the reserve force for the United States in time of war, it finally received the whole-hearted support of the people of Missouri. The trend away from pre-occupation with such purely domestic problems as the settlement of the frontier and the Indian menace to an increasing consciousness of the United States as a world power with world responsibilities has shown the necessity for a well-organized reserve force in the states. It was most practical to develop this force from the state militia, and to require state support as well as federal aid and training. The use of the National Guard in state disorders and disasters is still a factor in their popularity, but their duty as a reserve force for federal action led to the most widespread acceptance and expansion of the militia system.

THE FEDERAL VOLUNTEER SOLDIER IN  
THE AMERICAN CIVIL WAR 1861-1865

(Publication No. 1162)\*

Francis Alfred Lord, Ph. D.  
University of Michigan, 1949

The life of every Federal soldier in the Civil War differed to a varying degree from that of each of his comrades, but the general pattern of experience tended to be similar. A study of factors that contributed to the forming of this pattern is of value in that it brings together in one work a chronological treatment of the Federal soldier's military life in its main phases during the war.

In this dissertation a discussion of the motivations for enlistment and the reactions to the draft have been integrated with a treatment of the different calls for volunteers. The subject of the contributions of foreigners and Negroes toward the winning of the war has been treated in considerable detail. Militia and Regular Army units have been discussed only so far as their relationship to the volunteer force in such matters as training and supply of officers rendered such digression necessary. The importance of the whole problem of training in the Federal army has been stressed. This has involved a description of the army's organization from the high command down to and including the company.

The arms and services, as well as weapons and equipment used, have been treated separately. Included in the arms were infantry, sharpshooters, engineers, artillery, cavalry, signal, telegraph,

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balloon, and railroad units. The services included, in addition to the regular services of the army, some of the more important non-military agencies such as the postal service, sutlers, and the Sanitary and Christian Commissions.

Discipline in the Federal army was so directly proportional to the caliber of leadership that it was found advisable to examine intensively the types of men who officered the army and their ability in maintaining discipline. The proportion of desertion was an especially valuable indication in measuring the men's morale which fluctuated widely at various times in the Eastern and Western armies. Efforts to maintain morale took the form of rewarding the men by promotion and furloughs, supplemented by civilian agencies and propaganda devices of press and pulpit. This procedure and its efficacy have been discussed.

Although no attempt has been made to describe the battles and campaigns in detail, the battle efficiency of the combat arms has been discussed. As often as possible this discussion has been supplemented by material found in contemporary accounts. These accounts, taken from letters, diaries, and journals, have been used to depict the daily life of the volunteer in camp, prison, and hospital. Not only statistics on enlistments, discharges, and casualties, but also studies of the volunteer while on furlough, as well as his participation in political affairs have been discussed.

The research employed in this study has revealed a consistently basic pattern of experience for all volunteers in the Federal army, a pattern, however, that has varied to some extent in every individual soldier's experience. By examination of many individual accounts, the author has been enabled to present a composite picture of soldier life in the Federal army from 1861 to 1865.

## LANGUAGE, ENGLISH

### A WORD ATLAS OF THE GREAT LAKES REGION

(Publication No. 1098)\*

Alva Leroy Davis, Ph.D.  
University of Michigan, 1949

In the Great Lakes Region (the states of Michigan, Illinois, Indiana, and Ohio), the distribution of dialect words shows that there are two major speech areas, Northern and Midland. The Northern speech area is a continuation of the Northern speech area of Eastern United States, being closely related to the dialect of New York State and western New England. The Midland area, in like manner, is a continuation of the Midland dialect area of the central part of the East and of the Southern mountain country. The boundary between these dialects in the Great Lakes Region enters Ohio at the southern edge of the Western Reserve, proceeds westward through Ohio, follows the Michigan-Indiana state line with some dipping into northern Indiana, and continues through northern Illinois to the Mississippi River. Between Michigan and Indiana, the boundary is sharply defined, but in Ohio and Illinois it flares out into large transition areas which show a mixed folk vocabulary.

The Great Lakes Northern area appears to be homogeneous. No sub-areas showing important speech differences are found. The one possible exception is the Lead Region of northwestern Illinois, which shows a large admixture of Midland forms.

The Great Lakes Midland has two fairly well-defined sub-areas; North Midland and South Midland. Much of Ohio and northern Indiana resemble

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Pennsylvania in the use of folk words, while southern Indiana and southern Illinois more closely resemble the Southern hill country. These sub-areas, however, overlap a great deal.

One striking example of a speech island appears in the Great Lakes Midland. Marietta, in southeastern Ohio, is clearly set off from the surrounding Midland area by its retention of numerous Northern folk words.

Settlement patterns have determined the distribution of most of the folk terms. The areas settled by Yankees from New England and New York State use terms common in the Northern dialect of the East, and those areas settled by people from Pennsylvania and the Southern mountains use the terms found in those parts of the East and South. Other influences upon folk speech such as education, rapid communication, composite and shifting populations, have not produced, as yet, any major disturbances in the distribution of the folk words studied, but a trend toward greater speech uniformity is evident.

The study is limited to the folk terms for 100 concepts in the speech of older people with common school education. Seventy-eight communities are represented, carefully distributed throughout the four states. They form essentially a record of rural speech. Field records made for the Great Lakes Linguistic Atlas, supplemented by a correspondence survey, provide the data for the study. An innovation in correspondence technique is made in that linguistically naive informants marked their ordinary usage in answer to a written questionnaire. The results of the correspondence survey show a great similarity to those of the field work, indicating that the method is highly reliable.

## THE SPEECH OF NEW YORK CITY

(Publication No. 1103)\*

Yakira Hagalili Frank, Ph. D.  
University of Michigan, 1949

The purpose of this study is to analyze and to describe the pronunciation of English in New York City. Features common to all types of speakers as well as social differences and age differences in speech are treated and discussed.

The study is based upon records of the Linguistic Atlas of the United States. These records consist of phonetic transcriptions of approximately 800 items made of the speech of forty-six informants in New York City and in the Metropolitan area, including Suffolk, Nassau, and Westchester Counties in New York, and Middlesex, Union, Hudson, Essex, Bergen, and Passaic Counties in New Jersey.

Before an analysis of the social differences or age differences in speech was undertaken, a study of the phonemic system was made. On the basis of a preliminary survey, lists of words taken from the Linguistic Atlas were selected to illustrate each phoneme, the number of words used depending on several factors. If only one major variant occurred, few words were used. However, if it became necessary to resolve a phonemic problem, or to establish the spread of a variant, geographically or socially, all possible instances were used.

Variations in the pronunciation of the phonemes are positional or prosodic; or they are correlated with social classes, age groups, or individuals; or else they

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can be explained historically as the result of dialect mixture, either within a family, or a city, or along the boundary of two speech areas.

Uneducated speech and cultivated speech are characterized by distinct features of pronunciation. Older middle class informants frequently agree with the uneducated, whereas the younger may adopt features of cultivated speech. Certain variants are, nevertheless, common to all age groups and social classes. There is also evidence of the borrowing of upper class features by middle class, less frequently, by low class speakers. Cultured speakers, particularly cultured women, educated in finishing schools, adopt Standard British English sub-phonemic (and phonemic) features.

Differences in the incidence of phonemes, whether systematic (i.e., confined to particular environments or to a limited number of morphemes) or individual (i.e., confined to one morpheme), are readily noticed, imitated, and acquired. They are, therefore, the clearest indicators of regional and social differences in pronunciation.

The coalescence of the historical phonemes as in bird and Boyd, a feature confined almost entirely to New York City, is characteristic of the speech of the uneducated and of the older middle class informants. Most of the cultured and the youngest of the middle class informants retain the historical contrast. The usage of others is, however, very unsettled. This is not surprising in view of the complex population, the constant mingling of the social classes, and the strong influence of the schools.

Another feature which sets off New York City from most of the surrounding New England settlement areas is the difference in the treatment of the vowel phonemes before tautosyllabic and intersyllabic /r/. Hudson County, and parts of Middlesex and Bergen Counties in New Jersey, and southern Westchester Co. and Nassau County in New York agree with New York City in this respect.

THE HISTORY OF INFLECTIONAL n IN  
ENGLISH VERBS

(Publication No. 1141)\*

David Wooderson Reed, Ph.D.  
University of Michigan, 1949

Inflectional n is defined as a sound, identified in spelling by the letter n, which by itself or in combination with other features distinguishes one form of a given verb (including both finite and infinite forms) from another form of the same verb. Such inflectional n's occurred in Old English in all present subjunctive plurals, all present indicative plurals of preterito-present verbs, all preterite indicative and subjunctive plurals, all infinitives, all gerunds, and all strong past participles, but have become restricted in present-day Standard English to some sixty-one strong past participles.

In order to discover the patterns of loss of verb inflectional n between Old English and present-day English, statistically determined samples of verb forms in the categories enumerated were collected from forty definitely localized and dated texts between c950 and a1500 and from twenty non-localized texts from the eleventh and twelfth centuries, when few localized texts were available. These data were analyzed according to descriptive techniques in order to arrive at historical interpretations of the developments.

As was previously known, inflectional n was lost in the Northern dialect before c950 in the present subjunctive plural and the infinitive and before c1340

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in all other verbal categories except the strong past participle, where it was retained beyond 1500. Although these developments have been interpreted variously as the result of borrowing from Old Norse or of a combinative sound change within Old English, the earliest textual evidence seems insufficient to substantiate any such overall interpretation. The present data indicate, however, that n may have been lost in the finite categories through the analogy of n-less forms before we or ge (from the Germanic first person dual), and in the gerund through analogical substitution of the n-less infinitive. It appears not to have been pointed out also that n-less forms were extended to the present indicative plural immediately before or after a subject pronoun from the analogy of n-less forms before we or ge.

The evidence collected seems to substantiate previous statements that the loss of verb inflectional n from c1000 to c1400 in the South and to a1500 in the Midlands was primarily a combinative sound change in which final n was lost before a consonant or a pause, that the extension of n to the present indicative plural of all verbs in most of the Midlands from a1200 to a1300 resulted from the analogy of the present indicative plural of preterito-present verbs reenforced by the forms aron, bifon, and sindon, and that the general retention of inflectional n in the Midland strong past participle from which the sixty-one present-day Standard English n-forms have descended was due to dialect borrowing from the North. It is emphasized, however, by the date collected that many detailed analogies caused frequent fluctuations in the rate of loss of n in the various verbal categories. The evidence further suggests that coincident with the extension of n to the present indicative plural in most of the Midlands was a retarding of the rate of loss in other verbal categories in those areas.

## LITERATURE, ENGLISH

### THE SIGNIFICANCE OF IRELAND IN THE WORK OF W. B. YEATS

(Publication No. 1140)\*

Donald Ross Pearce, Ph.D.  
University of Michigan, 1949

This thesis seeks to interpret Yeats' poetry and thought in terms of his nationalism. Specifically, the aim is to show that a ruling passion for Ireland runs through all he did, influencing both the selection and treatment of his literary themes and symbols and that even those aspects of his thought which transcend the particular Irish circumstances and are of general significance--for example, his sustained attacks upon Rationalism, or his preoccupation with the Occult--are intimately bound up with a central and persistent anxiety over his nation.

The main critical assumption of this study is derived from recent psychological theory, which asserts that art-creation begins with some trouble in the artist's soul referable to a conflict which he cannot solve by direct action in the world of "reality"; in other words, that an artist creates from his "anxiety". The identification of Yeats' anxiety with his nationalism is the chief contribution to the study of Yeats offered by this thesis.

Yeats' life and work are divided into three periods: (1) the early period of the mystic Rose, "Castle Rock," and the Celtic Twilight, (2) the middle period of the Anima Mundi, Abbey Theatre, and "Unity of Culture," (3) the later period of the "System," Thoor Ballylee, and the poetry of bitter

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reminiscence. His literary and philosophic work during each of these periods is examined in relation to his changing attitude to Ireland during (1) the 'Eighties and 'Nineties when he hoped and worked for the arrival of what he called "Ireland's Great Moment," (2) the first fifteen years of the new century when he was plunged in disillusion over the defeat of that hope, (3) the later period of bitter acceptance of defeat. It is sought to show that changes and developments in Yeats' literary and philosophic work relate to and follow from changes in his attitude toward his nation.

## LITERATURE, FRENCH

### THE HUMANITARIANISM OF FRANÇOIS COPPÉE

(Publication No. 1145)\*

Ruth Naomi Horry, Ph.D.  
New York University, 1948

The purpose of this investigation is to present the causes, manifestations, and results of the humanitarian philosophy of François Coppée in regards to the common man as evidenced in his writings, both poetry and prose. Coppée is presented as a literary artist who is aware of the social and economic status of the less fortunate; and, because of his compassion and altruism, works toward the improvement of their condition.

This study is significant because of its social implications. François Coppée helped to democratize the tone and subject matter of French literature, particularly poetry. The reemphasis of humanitarian concepts becomes pertinent in the face of a growing skepticism about the whole concept of democracy, and the challenge being made to the democracies of the world by other ideologies.

Most of the previous studies on François Coppée are biographical or in the realm of literary criticism. The few studies discovered, which have a direct bearing on the problem, merely present Coppée as a poet interested in the commonplace aspects of life, depicting events in the lives of the common people. In these studies, Coppée has not been presented as a conscious humanitarian, but rather as a poet writing about subjects with which he was most familiar.

The approach to this study of François Coppée is

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historical. As a background, information is presented which indicates the major philosophic, political, economic and social trends and events which led up to Coppée's period.

In the chapter François Coppée and His Milieu, the writer's environment is restored as completely as possible. Coppée's own writings provide information concerning his life. The lacunae are filled from data found in the works of Coppée's biographers. There are presented the exterior forces,--home and family, socio-economic, literary, religious, political, --which determined the nature and development of Coppée's humanitarianism.

Chapter III, François Coppée the Observer, reveals Coppée's observation of the common man in these areas: labor: occupations, working conditions, wages, legislation, management; socio-cultural milieu, social institutions, penal institutions, migration, emigration, agriculture, industrialism, militarism, education and religion. In order to establish the validity of Coppée's portrayals, his depiction of existing conditions is collated with data found in the writings of contemporary and subsequent historians, sociologists, and economists.

Coppée's activities as a humanitarian are presented in the chapter, François Coppée, Spokesman, Citizen, and Patriot. Here, he is the social evangelist, bitter over what he has observed, and writing and speaking at great length on behalf of the common man. He excoriates the privileged few as responsible for the unhappy lot of the poor. Coppée discusses class and caste, the rich and powerful, social legislation, politics, government, world trade, taxation, speculation, colonization, militarism, patriotism, education, religion, and social progress.

The conclusions of the investigation reveal Coppée as having been influenced by his personal and humble origins, by the democratic and humanitarian principles of the romanticists of 1830, and by the positivist

spirit of the Second Empire and the Third Republic. His social philosophy is a fusion of sentimentalism, Christianity, and utilitarianism. The core and subject matter of most of his writings is the common man. As the Christian socialist, he believed in a more equitable sharing of the world's goods. He strove for the amelioration of the socio-cultural milieu of the common people. He fought for a government whose principles and practices would be based on Christian ethics. He worked for a unified nation in which social progress would become a reality. Because of the historical and contemporary significance of his social philosophy, François Coppée merits a prominent place in the history of humanitarianism in France.

## MATHEMATICS

### BRANCH POINTS OF SOLUTIONS OF EQUATIONS IN BANACH SPACE

(Publication No. 1096)\*

Jane Smiley Cronin, Ph.D.  
University of Michigan, 1949

F. Riesz, S. Banach, and others have generalized the Fredholm theory of linear integral equations to Banach space. However, except for a short note by R. Caccioppoli, nothing has been done regarding the corresponding generalization for the theory of ramifications of solutions arising in the non-linear integral equation theory as developed by E. Schmidt (Math. Annalen, vol. 65).

Schmidt considers an integral equation the linear part of which is of the form

$$u(s) - \int_a^b C(s,t) u(t) dt$$

If this expression, regarded as an operator on  $u(s)$  is singular, i.e., takes some function not identically zero into zero, then a theory of ramification of solutions is obtained.

The following Banach space generalization of Schmidt's integral equation is studied:

$$(1) \quad (I - C) x + Sy + T(x,y) = \theta$$

where  $I$  is the identity,  $C$  is linear, completely continuous,  $I - C$  is singular,  $S$  is a continuous transformation satisfying a Lipschitz condition, and  $T$  is a

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transformation with certain second-order properties. We investigate the local solutions  $x$  when a sufficiently small  $y$  is given. Analogous to Schmidt's "Verzweigungsgleichungen" (ramification equations), a mapping  $M$  of Euclidean  $n$ -space into itself, where  $n$  is the dimension of the null space of  $(I - C)$ , is obtained by a consideration of the projection of equation (1) in the null space of  $(I - C)$ . It is shown that the number of solutions  $x$  of (1) is equal to the number of points in the set  $M^{-1}(0)$  where 0 is the zero of the  $n$ -space. Thus the problem is reduced to the investigation of a mapping of  $n$ -space into itself. Instead of investigating the number of points in the set  $M^{-1}(0)$ , we study the topological degree of  $M$  at 0, which is a reasonable generalization of the number of solutions of the equation

$$M(x) = 0,$$

each solution counted with its "multiplicity." In this work, we determine the topological degree in two cases: first, if the null space of  $(I - C)$  has dimension one, and if a non-zero condition which is a generalization of Schmidt's condition:  $L_K \neq 0$ , is satisfied, then the topological degree is  $k$ . Secondly, if the dimension of the null space is two, if the same type of non-zero condition is satisfied for  $L_2$ , and if a certain condition on the constants in mapping  $M$  is satisfied, then the topological degree of  $M$  is four.

Using these results, we define a multiplicity for the solutions of an equation which is a special case of equation (1), i.e.,

$$(2) \quad (I - C + T)x = y$$

This multiplicity is defined to be the topological degree of  $M$ , the finite-dimensional mapping associated with (2). It is proved that if the Leray-Schander topological degree is defined for the transformation

$(I - C + T)$ , then the Leray-Schander topological degree is either equal to the multiplicity defined or is equal to this multiplicity times the factor  $(-1)$ .

Finally, in the appendix, we prove two lemmas which are stated but without detailed proofs by Leray and Schander. To the writer's knowledge, there are no complete proofs of these lemmas in the literature.

## MEDICINE

### THE MALE THORACIC INDEX AND ITS RELATIONSHIP TO PULMONARY TUBERCULOSIS

(Publication No. 1157)\*

Samuel Tubbe Robbins, Ed. D.  
New York University, 1948

Many theories regarding the shape of the chest and its association with tuberculosis disturbed the investigator to a point of scientific inquiry.

#### Statement of the Problem

The problem is to test the hypotheses that exist concerning the shape of the chest and its relationship to pulmonary tuberculosis.

#### Hypotheses

1. Individuals with flat chests are predisposed to, disposed to, susceptible to, or associated with tuberculosis.
2. Deep chests make better soil for tuberculosis.
3. There is no relationship between the shape of the chest and tuberculosis.

#### Need for the Study

The division of opinion alone warranted this study. The reason for this division showed the need. Close to two hundred authorities listed in the bibliography of the study expressed an opinion regarding the relationship, yet only ten measured tuberculous men. Subjective means for appraisal were used by seventy-one

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per cent (71%) of the authorities. Authorities who secured the thoracic index used divergent techniques, therefore, emerged with confusing results. A need to clarify interpretations of the index and new scores to test the old was felt by the experimenter.

#### Historical Sketches

Hippocrates (460-357 B.C.) called the "flat-chested" individual "phthisicus habitus" - the host for tuberculosis. Because of the prevalence of the disease and concomitant emaciation professional and lay people carried this picture to our present day. Draper,<sup>(4)1</sup> Davenport<sup>(3)</sup> and Jackson<sup>(6)</sup> supported the Hippocratean theory. Chomel (1828)<sup>(12)</sup> opposed the accepted opinion when he found that his tuberculous men showed deeper chests than healthy men. Hutchinson (1903)<sup>(10)</sup> and Weisman (1938)<sup>(12)</sup> strengthened Chomel's findings. Cotton (1858)<sup>(2)</sup> wrote, "Every form and physical development was found in connection with phthisis." Brown<sup>(1)</sup> (1904), McCloy and Tsong (1926)<sup>(11)</sup> and Hawes (1913)<sup>(7)</sup> agreed with Cotton.

#### Procedure

In order to test existing hypotheses the author culled assumptions from available literature and letters, secured a test to determine the shape of the chest, developed techniques for measuring, received approval (objectivity) for his techniques from an authority, selected a good sampling of tuberculous and non-tuberculous men, and finally evaluated his research.

#### The Test

The subjects were measured at the nipple level and at quiet respiration for the antero-posterior and transverse diameters.

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1. Refers to position authorities take in the bibliography.

### The Subjects

The investigator measured five hundred and four tuberculous and five hundred and fifty-eight non-tuberculous men.

### Treatment of Data

Data for numbers measured, range, mean, standard error of the distribution and standard error of the mean of the age, height, weight, anteroposterior and transverse diameters, and thoracic index is available. In comparing groups the difference between the means,  $\sigma^2$  of the difference between the means, the biserial correlations, and the probable error of the biserial  $r$  was computed.

### The Results

The investigator found the non-tuberculous men to possess a mean thoracic index of 71.897 and the tuberculous men scored 71.912. The difference between the means,  $.015 \pm .386$ , was in favor of the tuberculous men. Accordingly it is reasonable to say that no significance exists between the means of groups A and B. Computations for the biserial  $r$  showed  $.0016 \pm .008$ , which statistically states that **THERE IS NO RELATIONSHIP BETWEEN THE THORACIC INDEX (shape of chest) AND TUBERCULOSIS.**

### Conclusions

Hippocrates transmitted a subjective measurement that lived for centuries without being tested scientifically. Chomel, Hutchinson and Weisman became opponents to the accepted theory and believed that "deep-chested" individuals were associated with tuberculosis. The investigator believes that opinions varied and wandered because of poor samplings of

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2. Refers to standard error.

the parent body of tuberculous men. Taking all things into consideration this experimenter concludes that it is not the thoracic index of an individual that spells tuberculosis - it is the tubercle bacillus. He recommends that more studies of this kind be made in order to bring our text-book data up to date, and sees no application of the thoracic index for physical education or for medical purposes - the index will not give a clue to tuberculosis.

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## MINING, ENGINEERING

# A HISTORY OF LAND SUBSIDENCE AND ITS CONSEQUENCES CAUSED BY THE MINING OF ANTHRACITE COAL IN LUZERNE COUNTY, PENNSYLVANIA

(Publication No. 1159)\*

Ellis Wynn Roberts, Ph.D.  
New York University, 1948

### The Problem and Its Historical Background

When anthracite coal is mined, precautions must be taken to allow enough coal to remain as pillars to support the roof of the mine and the surface above. In addition, artificial supports must be built as reinforcement. Unfortunately, these precautions are neglected, for anthracite coal, like most United States resources, has always been mined as quickly and as cheaply as possible, with a view to low production costs and not to social welfare. As a result, unsupported coal and rock within the mine either shifts, or caves. This shifting of the earth causes a man-made, localized earthquake which has two catastrophic results: it destroys land, homes, public buildings, and human life, and it destroys thousands of tons of coal and deprives the nation of valuable natural resource reserves.

### Procedures

The problem of subsidence as a technical problem of mining engineering is explained. The manifestations of subsidence in Luzerne County are traced chronologically, and the reactions of the

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community diagnosed. Research is directed to ascertain the educational impoverishment attributable to subsidence. The history of successful and defeated state subsidence legislation is delineated. The judicial aspects of subsidence responsibility are weighed. Special emphasis is placed upon an analysis of the decision of Justice Holmes, declaring the Fowler-Kohler Act unconstitutional, and showing the inter-causal relationship between the adverse decision and the continuance of the problem in the lives of the people of the Anthracite coal region. The history of community efforts to control subsidence is followed by recommendations for the control and elimination of surface subsidence.

### Results

The collapse of the surface of the earth above areas which have been mined is caused by gravity, but the rock and earth movements caused by the gravitational force are still subject to research. Land subsidence due to mining has occurred in Europe, Asia, and many parts of America. Luzerne County has had sporadic outbreaks of subsidence for many years. The financial losses add up to millions of dollars. Several deaths and innumerable personal injuries are directly and indirectly attributable to surface caving. Many unsuccessful attempts to legislate against land subsidence caused by the mining of anthracite coal since 1911 have been made. The opposition of the anthracite coal corporations has prevailed and inhibited the passage of anti-cave laws. The principle that an owner or lessee of subjacent strata must support higher strata and the surface has been established and reasserted in English and American courts, but subsidence victims are rarely able to initiate court action. Organized community social action to combat mine caves has been abortive because of public confusion and apathy.

### Recommendations

There is an immediate need for measures to finance available engineering protection against subsidence. Some possible measures are: a system of subsidence insurance, similar to workmen's compensation or war damage insurance; a subsidence fund raised on a coal-tonnage basis of approximately two cents per ton, to be paid by the producer. Recommendations to lessen the danger of subsidence also include zoning and voluntary agreements between municipalities and coal corporations. Boroughs and cities might emulate the borough of Kingston and attempt to buy the coal beneath the municipalities so as to guarantee surface security for inhabitants. Citizens must work to build anti-subsidence organizations to compel coal corporations to comply with subsidence laws which already exist. Such organizations might yet be the force to effectuate the enactment of further strong legislation to protect individuals and private property.

## MUSIC

### THE SOUTERLIEDEKENS AND ITS RELATION TO PSALMODY IN THE NETHERLANDS

(Publication No. 1160)\*

Henry Allen Bruinsma, Ph. D.  
University of Michigan, 1949

Symon Cock, the first printer of music in the Netherlands, printed in 1540 a little volume of psalm translations set to folk tunes. This collection, the Souterliedekens, has long been neglected, and the later history of the psalm-singing movement can only be fully understood in the light of the history of this first metrical psalter in the vernacular.

Although some writers suggest that members of the Dutch Chambers of Rhetoric compiled the Souterliedekens, and some refer to Clemens non Papa as the author, new evidence has been uncovered which strengthens the tradition that Willem van Zuylen van Nyeveldt, a Utrecht nobleman, was the author.

The Souterliedekens gives us an excellent example of the musical notation of the Sixteenth Century. Of greatest interest in the notation is the use of the signum congruentiae. This sign, heretofore considered by scholars as a Sixteenth Century contrapuntal warning sign, was used in the monophonic Souterliedekens as a sign of repetition.

The popular Souterliedekens went through thirty-three editions between 1540 and 1613. Many Dutch Protestant song books during the following century used melodies taken from this psalter, and these melodies thus became so popular that some were no longer remembered by their secular title but were

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referred to by the first line of the Souterliedekens psalm-text.

According to the Prologhe of this little psalter, the versifications of these psalms were based upon the original Hebrew. The translation, however, reveals a strong influence of the Lutheran Bible. The singing of these psalms to secular tunes apparently became a popular method of confusing the Spanish Inquisition. Used thus by all shades of Protestants, the Souterliedekens was spread throughout the country and was taken by Dutch refugees to England. There it was finally replaced by the Psalter of Wtenhove which were patterned after the Genevan Psalter of John Calvin. The Souterliedekens appears to have been used by the Dutch Calvinists until 1568 when the Synod of Wesel authorized the exclusive use of the Genevan Psalter as translated by Dathenus.

The importance of the Souterliedekens may be summed up as follows: it was the first metrical translation of the psalms into the vernacular; it was the first musical product of the Dutch Reformation; as a literary work it reflects the religious thought of the early Dutch Reformation period; it provided the Dutch Protestants with music which fit the needs of their religious philosophy until their union with the French Calvinists brought to them the Genevan Psalter; it set the pattern for religious song for a century in the Low Countries and was imitated or borrowed from in many of the later song books; as a collection of printed folk music, it provides us with the most complete reference work for Sixteenth Century Dutch folk tunes.

## PHYSICS

### THE THERMAL ANOMALY OF THE ALLOY OF 80%Ni AND 20%Cr ( $Ni_3Cr$ )

(Publication No. 1107)\*

John Marion Hinkle, Ph.D.  
University of Michigan, 1948

The anomalous behaviour of the alloy of 80%Ni and 20%Cr over the temperature range from 750°F to 1400°F has been investigated by measurements of electrical resistivity and specific heat. It has been found that the decrease in electrical resistivity with increasing temperature over this range is reversible, although at temperatures below 900°F equilibrium is attained very slowly. There is a corresponding anomalous increase in the specific heat on heating. The data indicate that the specific heat of the alloy, when quenched from 1800°F, is less than when annealed at 900°F.

Consideration of mechanisms which could cause this behaviour indicates that only two are probable: the precipitation of small particles of a second phase or the formation of small locally ordered regions. The dimensions of these particles or regions must be less than that corresponding to maximum scattering power for conduction electrons, and their number or size must be a decreasing function of the temperature over the anomalous range. Both mechanisms could account for the resistivity and specific heat anomalies.

Neither the data of this investigation nor any found in the literature are sufficient to determine which if either of these mechanisms is responsible

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for the anomaly. No explanation has been found for the indicated difference between the specific heats of the annealed and quenched alloy. In view of this, a series of experiments is proposed, which it is believed would provide helpful information.

## POLITICAL SCIENCE

### PRESIDENTIAL SUCCESSION

(Publication No. 1118)\*

Ruth Caridad Silva, Ph.D.  
University of Michigan, 1948

This study is based chiefly upon an examination of the records of the conventions which framed and ratified the Constitution, debates in Congress, judicial opinions, and other official documents. These sources demonstrate that the successor to presidential power was not intended to become President. The study follows the development of the precedents by which the Vice President becomes President when the President dies and the theories by which the usage is attacked and defended. The author finds that the precedent is contrary to the intent of the Constitution, the theories in its support are unsound, and that it has complicated other problems of succession, i.e., presidential inability and provision for succession beyond the Vice President.

A solution to the inability problem is suggested. The author concludes that because of the precedent a Vice President succeeding in case of vacancy should be recognized as President for the remainder of the term, but that a Vice President succeeding in case of inability should only act as President for the duration of the President's disability. The term inability covers all cases in which the President is in fact unable to perform a function which the public interest requires. The power of deciding the existence of inability should be vested in the successor. To relieve him of embarrassment, the Cabinet should be

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authorized to investigate any alleged inability and report the facts to the successor. This could be accomplished by concurrent resolution of Congress but, in view of our constitutional development, probably should be done by constitutional amendment.

The author believes the succession laws of 1792 and 1947 unconstitutional because the presiding legislative officers are not "officers of the United States" in the constitutional sense. Further, the Act of 1947 is unsound because it requires the officer who acts as President to resign the office to which presidential power is annexed. Such resignation vitiates the right to act as President. Finally, placing legislative officers in the line of succession is not, in the author's opinion, in harmony with the principles of popular government. The records of the Federal Convention clearly indicate a power in Congress to limit the tenure of the designated officer by calling a special presidential election. The President and Vice President so elected must have four-year terms.

A plan is proposed suggesting that Congress establish an office of assistant President, the incumbent of which would be appointed by the President and Senate and would succeed to the presidential power after the Vice President. The President would assign to this officer duties calculated to relieve the President's burden and train the officer for his role as acting President. Enactment of this plan is held to be within the power of Congress. The incumbent of the office would likely be a person of presidential stature since he would be chosen with reference to his abilities as a possible Chief Executive. The proposal is held to be in harmony with the principles of popular government since the successor would probably continue the policy approved by the people at the last quadrennial election.

## PSYCHOLOGY

### THE RELATION OF PERSONALITY MALADJUSTMENTS OF 503 UNIVERSITY OF MICHIGAN STUDENTS TO THEIR OCCUPATIONAL INTERESTS

(Publication No. 1101)\*

Don B. Feather, Ph.D.  
University of Michigan, 1949

By means of the Minnesota Multiphasic Personality Inventory and the Kuder Preference Record the author of this study tested the hypothesis that measurable relationships exist between personality maladjustments and occupational interests. Five hundred and three students at the University of Michigan, most of whom were veterans, who had been consecutively counseled at the Bureau of Psychological Services at the University, were the subjects of this investigation.

Any individual that had a T-score of 70 or more on any of the scales of the Multiphasic was considered maladjusted. Likewise, Kuder's practice of using the 75th percentile as the level of significance on all his scales was adopted. A modified Fisher  $t$  formula for testing the reliability of the differences of percents was devised and used consistently to test the differences between the occupational interests of the normal and of the maladjusted individuals with whom the study was concerned.

The foregoing procedure revealed that the students in question who had personality maladjustments as previously defined were more apt to have occupational interests which fall within the Kuder range of significance (75th percentile or above) in the Literary, Musical, and Artistic areas than were those who had

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normal profiles on the Multiphasic and were less apt than the latter to have interests in the mechanical and scientific areas.

The significance of these findings for counselors is pointed out and further research which is the out-growth of this investigation is indicated.

## THE RELATION OF SET TO REASONING IN THE MAZE

(Publication No. 1104)\*

Michael Meyer Gilbert, Ph.D.  
University of Michigan, 1949

A preliminary study of learning and reasoning by the human on a drum maze which permitted no fixed orientation from the beginning or end showed that college students failed markedly in a reasoning problem wherein they were given an opportunity to use a blind as a short-cut. In other studies, it had been found that rats were able to solve an analogous problem to a high degree. The following experiments were conducted in an attempt to get at the reason for this failure:

- I. Three feeble-minded children (7 yrs., 2 mo. to 10 yrs., 8 mo.) were tested on the reasoning test and two showed a partial success.
- II. To test the assumption that overlearning might be a factor in failure, one group of college students only partially learned the maze and were tested on the short-cut. Another group of college students used as controls thoroughly learned the maze and were also tested. Partial learning did not increase the number of successes indicating that overlearning did not result in stereotypy.
- III. An opportunity was provided for the subjects to learn the maze "insightfully" by placing pairs of symbols with common elements at the blind-true path junctions. It was found that only 22%

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of college students were able to abstract or learn by insight, yet this group did significantly better on the reasoning problem than those who did not abstract. A group of those who failed to abstract were given an additional motivation in running the maze in the form of a time-incentive, and it was found that this group did significantly better in the reasoning test than previous groups without the time-incentive. A small group of those who failed without the time-incentive were later given the time-incentive, but all persisted in failure when tested with the reasoning problem again. It was found also that most of those who succeeded with the time-incentive, got the solution immediately on being confronted with the problem situation, while those who succeeded without the time-incentive got the solution some time later on succeeding trials.

- IV. The original experiment was repeated using third and fourth grade children as subjects, the only difference being that the maze was shortened somewhat and a reward was given in each learning trial for reaching the end. It was found that the grade school children did significantly better than college students in the reasoning problem.
- V. The experiment was repeated with a similar group of children but this time they were punished every time an error was made in the learning trials. This group was found to do significantly poorer on the reasoning test than the group of children who were rewarded during the learning period.
- VI. A group of college students was permitted to learn the maze without anyone being in the room to take records of their errors while learning. They were then given the short-cut problem. There was an increase in the number of successes

and in the number who learned insightfully.

On the basis of the results of these experiments, the failure of college students in the reasoning problem is explained by offering the hypothesis that the college student has an "error-conscious" set which in this situation prevents him from getting the notion of using a blind as a short-cut whereas the rat and the child lack this set, and rather have a "goal-directed" set which makes for the proper solution. The relation of abstractive ability to problem solving is brought out as well as the difference in the relation of the two sets to the nature of the solution.

## EFFECTS OF EXPOSURE TO SOUND ON DISCRIMINATION PERFORMANCE IN THE RAT

(Publication No. 1117)\*

Jane Shohl, M.D., Ph.D.  
University of Michigan, 1948

An experiment has been described in which 50 rats were trained for 61 days in a difficult discrimination situation, following which they were exposed to noise on 10 occasions each. Practice on the discrimination continued during the period of exposure to noise. The relationships between learning and susceptibility to convulsions, and the effects of exposure to sound on performance were analyzed.

1. With respect to the learning performance of the animals, it was found that learning continued throughout the experiment; and that there was a discrepancy between error scores and starting time as measures of performance for a given day or for a given animal.

2. With respect to the performance of the animals during exposures to noise it was found that about one-half of the animals showed the convulsive pattern at some time during the experiment, but that adaptation to sound did not occur.

3. With respect to the relation between learning ability and susceptibility to convulsions, it was found that there is no evidence that the two are related in any way either for good learners or for the group as a whole.

4. With respect to the effects of auditory stimulation on discrimination performance, it was found

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that exposure to sound in itself does not produce changes in behavior by any of the criteria used, but occurrence of a convulsion does increase error and starting time scores, lead to stereotypy, to regression, and to qualitative changes in behavior. The disturbance could not be detected during subsequent control periods of several days duration. The defect is one of performance rather than learning, and is expressed by a single individual rat in a variety of ways, i.e., is generalized in nature.

It is concluded that behavior alterations of rats in a discrimination learning situation which occurred following sound-induced convulsions were characteristic of animals in a disturbed emotional state. The effects are comparable in essential respects to those seen following convulsions obtained by other techniques in rats, and to those seen in man following shock treatment and in epilepsy. The generalized psychological explanation in terms of emotional disturbance cannot be traced directly to the frustrating conditions preceding the convulsion, to the convulsion itself, or to the subsequent catatonia but will probably find its physiological counterpart in some equally general organic disturbance interfering with normal cellular metabolism.

**A STATISTICAL EXAMINATION OF SHELDON'S  
CONCEPT OF PRIMARY COMPONENTS OF  
MORPHOLOGY**

**(Publication No. 1120)\***

**Robert S. Waldrop, Ph.D.  
University of Michigan, 1948**

Historically the evaluation of personality and temperament underlying behavior has been sought in the measurement or classification of body build. In the earliest days of man's interest in the problem of such classification, his efforts at evaluation were made largely through observation of the elements and other members of the animal kingdom.

In the renaissance period greater emphasis on scientific measurement and more attention was given to the relationship of body build to the various aspects of biological knowledge of man which was accumulating and being organized. The progress of inquiries into the areas of Psychology, Pathology, Physiology, Anthropology and Heredity were reviewed in this study.

The study of relationships made clear that more precise definitions were necessary. The chief contribution of a large number of investigators has been through their study and application of measurements or through statistical analysis of groups of measurements. On the basis of these contributions, it became evident that a general lack of agreement existed as to the definition of constitution, morphology, physique, body types, etc.

**One of the most recent and more objective methods**

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of classification of morphology has been the somatotyping procedure outlined by Sheldon in The Varieties of Human Physique. Somatotyping is based on the assumption of three primary biological components. Sheldon has selected seventeen anthropometric measurements and an index of volume to describe these biological components. The question then arises, do the anthropometric measurements used by Sheldon actually describe the three biological components postulated? The answer to that question constitutes the purpose of this study.

The entire freshman class of 999 males entering the University of Michigan in the fall semester 1940 made up the population studied. This group was comparable in age and racial background to the population used by Sheldon. Photographs and measurements were made in accordance with the procedure outlined by Sheldon. In addition three measurements and six observations on the presence of fat and muscle were included. The resulting measurements were subjected to a centroid factor analysis. The analysis was deemed essentially complete after five factors were extracted. Five independent variables were selected and multiple correlations coefficients were computed from the factor loadings. Standard regression coefficients were obtained in terms of the five independent variables.

The principal results of the investigation may be summed as follows:

(1) Inspection of the matrix of standard regression coefficients revealed four significant constellations of variables: (a) linearity; (b) mass; (c) muscle; and (d) cephalic.

(2) The four identifiable constellations isolated in this study were essentially in agreement with those found in other similar investigations.

It was concluded that there appears to be some anthropometric support, in the measurements used, for Sheldon's hypothesis of three primary biological components.

THE RELATIONSHIP BETWEEN PERSONALITY AND  
EFFICIENCY IN THE USE OF PROSTHESES BY  
AMPUTEES

(Publication No. 1146)\*

Sidney Levy, Ph. D.  
New York University, 1948

This investigation explored the relationship between personality and prosthetic efficiency of above-the-knee amputees. An experimental population of 48 above-the-knee amputees was selected by using the technique of random sampling on the basis of tables of random numbers. After the population was selected standardized motion pictures were taken of each subject as he performed basic locomotor tasks. On the basis of these motion pictures a board of three experts rated each subject's prosthetic efficiency. A rank order distribution was arranged using efficiency ratings as the criteria. The upper 25% of this distribution (the efficient group) was then compared with the lower 25% (the inefficient group) with respect to certain psychological data.

The psychological data included scores secured by administering the Wechsler-Bellevue Intelligence Scale, the Bell Adjustment Inventory and the Rorschach Test. In addition each subject was interviewed by a psychiatrist who completed a check list of eight pairs of polar trait clusters, and examined by a neurologist. Mean scores achieved by the efficient group were compared with the mean scores of the inefficient group in each of the Wechsler, Rorschach and Bell scoring areas and the t-test of significance was

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applied. Correlations between efficiency in each of the polar trait clusters were analyzed by computing tetrachoric r's.

It was found that there was a relationship between certain aspects of personality and prosthetic efficiency. Eleven Rorschach Test components were significant at the 5% level of confidence and six Rorschach Test components were significant at the 1% level of confidence. Of the eight pairs of polar trait clusters, four pairs were found to be related to prosthetic efficiency. The relationships were indicated by tetrachoric r's ranging from +.72 to +.95.

Qualitative analysis of the Rorschach mean scores indicated that the efficient group was characterized by superior affective adaptability, more effective rational control in the face of emotional pressures from the environment, more conscious awareness of inner disturbance and a higher level of productivity, energy, drive, and ambition.

The psychiatrist's ratings indicated that the efficient group was "easy going, genial, warm, generous," "hard-boiled, poised, frank," "conscientious, responsible, painstaking," and "dominant, ascendant, self-assertive"; whereas, the inefficient group was "inflexible, cold, timid, hostile, shy," "sensitive, sympathetic," "emotionally dependent, impulsive, irresponsible," "submissive, self-effacing."

No relationship was found to exist between prosthetic efficiency and Wechsler-Bellevue scores or Bell Adjustment scores, nor was an intensive neurological examination able to disclose any differences in neurological status between the efficient prosthetic users and the inefficient prosthetic users. Similarly, the latter two groups achieved mean Munroe Inspection Rorschach scores which did not differ significantly.

## CHANGING OBJECTIVES IN PSYCHOLOGICAL TREATMENT

(Publication No. 1147)\*

Joel Shor, Ph.D.  
New York University, 1948

This dissertation is an attempt at a philosophic synthesis of the new concepts and hypotheses in modern psychotherapy concerning the meaning of "good adjustment." The data employed in this study are primarily the formulations of psychotherapists published since 1930 in the professional journals, monographs and textbooks dealing with the theory and practice of psychological treatment. The professional literature of related social and natural sciences is also analyzed when it provides data or hypotheses which bear directly upon the immediate problem of defining the nature of psychological adjustment.

There are five chapters.

Chapter one introduces the general problem, the related literature, the specific questions and the procedure. The current popular concern with psychological disorder and psychological treatment is interpreted as an extension of the liberal-democratic traditions in American culture; democratic men are increasingly sensitive to their inner life, in search of a more fulfilling life-experience. Psychotherapy is here viewed as an old social tradition which is now being equipped with new scientific data about man. Yet the survey of professional literature indicates an over-emphasis upon comparisons of methods of therapy and a neglect of careful definitions of the

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goals of therapy. The specific questions raised here are: the variety of expressed objectives in psychotherapy, the theoretical and experimental supports for each type of treatment goal, the conflicting issues among the several types of goals, and finally, the attempt at a synthesis of these conflicts toward a philosophy of psychotherapy.

Chapter two provides a brief historical background for the current philosophies in American psychotherapy. Three major trends are analyzed: the Psychological Clinic, published from 1907 to 1935, Freud's Psychoanalysis, in his Clinical Papers, covering 1896 to 1925, and the early Mental Hygiene movement up to the middle 1930's. These writings are explored carefully for their changing definitions of the goals of treatment. The specific needs for a more systematic definition of adjustment are listed and demonstrated.

Chapter three presents the results of the comprehensive analyses of all current definitions of successful personal adjustment. Eight basic types of definition of adjustment are evolved logically through the gathering of experimental and clinical evidence. Each of these eight types is interpreted as the product of a particular approach to the human personality. Thus, defining adjustment in terms of overt behaviors leads to the implication that adjustment is the conformity to social norms. Defining adjustment in terms of character traits also implies that the existing social standards and ideals are precise, integrated and validated. Defining adjustment in terms of clinical syndromes assumes that the diagnostic labels describe man's inner life adequately. Therefore, the study of man's feelings and emotions is interpreted as a necessary starting point toward defining the goal of a richer life-experience. Then there are crucial

refinements of the definition of adjustment in terms of the depths of personality: psychic motives, unconscious personality mechanisms, the total psyche (Id-Ego-Superego), and finally the principles of continuity and change in the person as he proceeds from each stage of emotional development to the next.

Chapter four is a methodological discussion of the dilemma of man's multiple value-judgments as a special obstacle to evolving a scientific definition of good personal adjustment. The science of psychology is seen as subject to three basic types of distorting motives, corresponding to the Id, Superego, and Ego.

Chapter five is the attempt at a more personal synthesis of the new trends in the philosophy of psychotherapy. The results of Chapter three and the methodological issues of Chapter four are brought together in an interpretation of the current goals of psychotherapy as intrinsic to the liberal-democratic ethos of American culture.

INDOCTRINATION FOR MINORITY GROUP MEMBERSHIP AND ITS RELATIONSHIP TO SOCIAL ACCEPTABILITY

(Publication No. 1158)\*

Max Rosenbaum, Ph. D.  
New York University, 1948

**The Problem**

The aim of this investigation was to study indoctrination for minority group membership and its relationship to social acceptability of the individual within a group of age-mates who are members of the same minority group.

The following specific problems were involved:

1. The selection of subjects who are most and least socially acceptable.
2. The selection of an instrument to measure:
  - a. the child rearing and training, and
  - b. emphasis on minority group membership indoctrination of a group by certain mothers.
3. The investigation of the relationship between the kind of minority group membership indoctrination an individual receives and the social acceptability of the individual.

**Delimitations**

1. The study was limited to Jewish American boys registered at \_\_\_\_\_ House settlement center.

2. The study was limited to those boys whose

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mothers could be interviewed.

3. The boys selected for intensive study came from unbroken homes, - no divorce or separation of parents.

### Significance of the Study

1. The study attempted to establish whether boys can be indoctrinated for minority group membership and whether this indoctrination contributes to their adjustment to their own minority group.

2. The study attempted to survey methods of child rearing and training that are used by mothers of most and least socially acceptable boys.

### Method of the Investigation

Each of 100 boys in 11 different clubs attending a settlement house in a sociologically homogeneous community was given a sociometric questionnaire in which he was asked which boys he would prefer to associate with in three given situations. From this sociometric technique, a scale of social acceptability was devised. Next, the 38 mothers of 43 boys who ranged along the entire scale of social acceptability were interviewed. The interview covered methods of child rearing and training as well as indoctrination for being Jewish. The mothers were also asked what their reaction would be: (1) if their sons were to marry non-Jews; (2) if their sons were to change religion. In addition each of the boys was administered an abbreviated form of the Wechsler-Bellevue Intelligence Scale and a brief interview.

### Results

Analysis of the interview material obtained from the mothers reveals that the minority group membership indoctrination these mothers carry out are in three qualitative constellations: Religious - emphasis on religion; Religious-Cultural - emphasis on both

religion and culture; Cultural - emphasis on culture only. No one method of indoctrination guarantees social acceptability but there is extreme range of social acceptability within each constellation. Almost all of the mothers were resistant to their sons leaving the Jewish group.

The majority of the boys conceive of being Jewish as a religious concept and appear to have been indoctrinated in substantially the same or approximate constellation as their mothers intended them to be. In addition, there is no distinction between the training practices of the mothers of the most socially acceptable and least socially acceptable boys. There is no relationship between intellectual level as measured by the Wechsler-Bellevue Intelligence Scale and social acceptability.

### Conclusions

The study gives no evidence of any relationship between the kind of indoctrination a boy receives from his mother and the degree of social acceptability this boy attains. In addition, there is no evidence to indicate any significant differences in certain aspects of child rearing and training between boys who are most and least socially acceptable.

## PSYCHOLOGY, PATHOLOGICAL

### THE PSYCHOLOGICAL EFFECTS OF PREFRONTAL LEUKOTOMY ON SCHIZOPHRENICS

(Publication No. 1131)\*

Earl Eugene Swartzlander, Ph.D.  
New York University, 1948

#### THE PROBLEM

The problem was to determine the psychological effects of prefrontal leukotomy on schizophrenics with particular attention to the effects on intelligence, on personality, and on behavior.

#### METHODS AND PROCEDURES

The subjects of this study were nineteen male schizophrenic patients at the Northport, N.Y. V.A. Hospital, ranging in age from 23 to 54 with a mean age of 34.5, ranging in duration of illness from 2 to 27 years with a mean of 7.7 years, and ranging in educational achievement from sixth grade to twelfth grade with a mean grade achievement of 9.0. All subjects had been assaultive, hyperactive, suicidal, or negativistic and required maximum hospital supervision. Use of all other less drastic treatment had been ineffective. The operations were performed at the Bronx V. A. Hospital by J. E. Scarff who used the "direct vision" operative technique.

The test battery used for reflecting changes in intelligence, in personality and in behavior was administered one month before and three months after operation, and included: Forms I and II of the Wechsler-Bellevue, the Porteus Maze, the Rorschach, the Draw-A-Person, the Bender-Gestalt, the Sentence

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**Completion and the Roe Behavior Scale.**

On the Wechsler-Bellevue Scale the statistical significance of the mean differences between pre- and post-operative total I.Q., verbal I.Q., performance I.Q. and each of the ten subtest weighted scores was determined by means of Fisher's small sample technique. The Porteus Maze data, in terms of mental ages, were treated similarly.

Pre- and post-operative group and individual Rorschach protocols were evaluated and the changes were interpreted. The figure drawings were rated on a five point scale and comparisons were made between the pre- and post-operative scores. The Bender-Gestalt design reproductions were analyzed figure by figure for each subject and post-operative gain or loss was indicated. These reproductions were then scored for five schizophrenic signs and the scores for each subject and group were compared. The Sentence Completion Test responses were scored as positive or healthy, neutral, and conflict or unhealthy, and the results were evaluated for group and individual changes.

The Behavior Scale ratings for each of the thirteen categories of behavior were studied to determine the direction and the extent of change in ward behavior.

**RESULTS**

Total intelligence was not significantly affected by leukotomy although a mean loss in total I.Q. of 4.74 points, from 84.11 to 79.37, was found. Subjects older than thirty years of age and those with pre-operative I.Q.'s above 84 consistently suffered some intellectual loss. Verbal ability was more adversely affected than performance ability. Statistically significant losses in judgment and social resourcefulness with strong tendencies toward losses in internal and external concentration ability were found.

The important effects on personality were found to be: narrowed intellectual interests, increased apathy and energy, reduced respect for reality, lowered

conformity, improved concept of the body image and the self and improved perception and adaptive behavior.

The general effect on ward behavior was found to be improvement. Areas most affected were: general activity, work activity, cooperation in ward routine, aggressive behavior, general mood level, social behavior and sleep. Important losses were found in attention to appearance and toilet habits. Marked improvement of behavior, in terms of ward manageability was found, although the schizophrenic process was not affected.

### CONCLUSIONS

It is concluded that global intelligence is not affected by leukotomy although judgment and social resourcefulness are adversely affected. Personality, from a total view, is adversely affected by leukotomy although these subjects are much less likely to be dangerous to themselves and to others after operation. The most outstanding effect of leukotomy is improved ward manageability, which appears to be obtained at the expense of important personality potentials.

## PUBLIC HEALTH

### SELECTED SANITARY PERSONNEL FOR LOCAL COMMUNITY SERVICE

(Publication No. 1116)\*

Charles Floyd Shockey, Ed.D.  
University of Michigan, 1949

Statement of the Problem. This study is concerned primarily with the determination of the duties and qualifications required by the merit system specifications of the various states for selected local sanitary personnel excluding veterinarians and engineers; and secondarily with the in-service and pre-service training programs, available in the several states, for the preparation of these individuals.

Sources of Data and Methods Used. Data for this study were obtained from the merit system specifications of forty-three states. These were obtained through correspondence with the various state departments of health. The information concerning training programs was received in the form of letters, catalogues, and sample programs from forty-five states and was analyzed for type, content and prevalence.

A detailed item analysis of the merit system specifications was made and frequency tables constructed. Other data were treated more descriptively than statistically.

Findings. There were 131 positions described by the merit systems from the forty-three states. The specifications for these 131 positions listed a total of 1553 duties to be performed. This represented

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564 different items. The direct inspectional type of duty accounted for 43.98 per cent of the total frequencies. Of the different knowledges listed, those pertaining to the principles and practices of public health were given greatest emphasis (26.21 per cent of the total frequencies). The ability to work with other people was most frequently mentioned. Good judgment ranked first as a required personal trait. Education on the college level was required for 58.46 per cent of the positions while experience was required by most of them. The type of experience most frequently specified was in sanitation. The average number of years required ranged from less than three to more than five. Certain substitutions for education or experience or both were allowed in many instances.

The type of training programs included (1) field training, (2) apprentice training, (3) college credit courses in sanitation, (4) in-service training, (5) four-year college courses and (6) lecture courses. Information regarding these programs was very limited.

Conclusion. Wide variation and inconsistencies among states as well as among various level positions within states exists with regard to the various items studied. The necessary knowledges, abilities and educational qualifications required frequently are not those which would make possible adequate performance of the duties specified by the merit systems. Likewise, from the information available, there is wide variation in training programs among the various states with no general pattern in evidence. To reduce these inconsistencies there is a need for the restatement of the merit system specifications. This suggests the need for the establishment of criteria for (1) the assignment of duties, (2) the requirement of special qualifications and (3) the amount and type of education and experience that should be specified for the different level jobs. Once better criteria and standards are established and the responsibilities and competencies more clearly defined the training programs can be made more functional.

## SOCIAL SCIENCE

### THE STRUCTURE OF THE METROPOLITAN COMMUNITY: A STUDY OF DOMINANCE AND SUBDOMINANCE

(Publication No. 1089)\*

Donald J. Bogue, Ph.D.  
University of Michigan, 1949

This study is an exploratory attempt to test certain broad hypotheses concerning the influences which large metropolitan centers exercise upon the distribution of rural and urban populations and upon the manner in which local communities sustain themselves in the broad "hinterland" surrounding such metropolitan centers. All data are taken from the Sixteenth Census of the United States, and are for the years 1939 or 1940.

The entire land area of the United States is divided into 67 metropolitan communities, each community consisting of a central city and a hinterland composed of outlying city and county units of rural-farm and rural-nonfarm populations. The intensity with which these populations inhabit the land (population per hinterland square mile) is analyzed by four variables: Size of metropolitan center nearest which they lie; distance from the metropolitan center; type of sector in which located; and size class of the local population unit. The "type of sector" classification is a three-fold division of the hinterland into "inter-metropolitan", "subdominant", and "local" sectors, depending upon whether the units lie in areas traversed by major transportation routes, in areas lying along a line from the metropolis through an outlying

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nonintermetropolitan city of 25,000 or more inhabitants, or in areas having neither of the above characteristics. The size class of the hinterland population unit is, for the urban population, the size of the individual city in 1940; for rural-nonfarm and rural-farm populations it is the size classification of the largest city contained in the county in 1940.

It is found that there is a tendency for population to occupy the hinterlands of large metropolitan centers more intensively than those of small centers. With increasing distance from metropolitan centers of all sizes all populations occupy the land with decreasing intensity. Subdominant and intermetropolitan sectors are more intensively occupied than local sectors. The hinterland cities appear to be points of influence about which the rural-farm and the rural-nonfarm populations aggregate. The typical pattern for each variable appears to remain in the presence of the other three, although there is a great deal of interaction among the variables. These findings are substantiated in another way by showing that the general elements of the patterns are manifest in each of the geographic regions. Because three of the variables refer to location with respect to metropolitan centers it is presumed that in the United States such cities exercise some direction and control over the settlement of the land. On the other hand, it is evident that hinterland cities exert a secondary influence over the distribution of the population.

The sustenance structure of the metropolitan community is also examined by relating the degree to which the populations are specialized in the activities of retail trade, services, wholesale trade, and manufacturing to the above four variables indicating hinterland position. It is found that each activity has its own distinctive pattern of specialization, and that there are, as a consequence, patterns of interdependency among the parts of which the metropolitan community is composed. These patterns of land occupancy and

specialization indicate a definite organization of the population to sustain itself in its environment. The position of the central city in the structure indicates that its influence consists of establishing circumstances to which the various hinterland units must adapt if they are to thrive, and in integrating the activities of those units.

The terms "dominance" and "subdominance" are used to refer to the influences of the central cities and the hinterland cities. In an effort to establish a frame of reference for future research in this area, these terms are given concrete meanings derived from the findings of the study, and from the principles of general ecology.

THE POLISH PEASANT IN TRANSITION: A STUDY  
OF GROUP INTEGRATION AS A FUNCTION OF  
SYMBIOSIS AND COMMON DEFINITIONS

(Publication No. 1164)\*

Peter Andrew Ostafin, Ph. D.  
University of Michigan, 1949

The purpose of this study is to observe the relationship between symbiosis and common definitions, to see what the consequences are when these factors either reinforce each other or when they clash with each other. Observations to test these relationships were made by referring them to a field situation, complex enough to be divisible into a rural and an urban segment. The groups observed were both located in Michigan. The former was a Polish community in Riggsville, Cheboygan County, consisting of fifty-seven families. The latter was a sample group of 175 Polish families selected from an original nucleus established in the neighborhood of the Parish of the Sweetest Heart of Mary, Detroit. Data were gathered by means of schedule-interviews and documents. In both instances, the study began with the first generation characterized by a relatively similar background of peasant experience. With this relatively similar background as a constant, the implications of continuity in the rural situation and those of change in the urban situation became apparent. Succeeding generations accentuated the process.

In Riggsville adjustment was achieved by the continuation of the peasant way of life. It embodied conditions which called for a minimum of conscious

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definition. Verbalization and precise evaluation of relations were not important. The few instances of common definition necessary for community order owed their source to a relatively uninterrupted tradition. On occasions when new views were required, these were imposed authoritatively (with a lot of care for previous custom) by the one official of the one dominant institution in the community. This official was the priest of the local Roman Catholic Church. There simply was no other supra-familial institution in the community significant enough to compete with the church, and so there was no official comparable to the priest in power and status. Whoever dared to disagree with his system of control exposed himself to effective ostracism by the whole community and to extra-legal pressure.

The Detroit situation immediately imposed a new structure of action upon the immigrants. This meant introduction to a way of life different from any they had experienced previously. Its range of symbiotic opportunities extended beyond the imported routines of an old family-farm system. This required interpretation. So, too, the imported peasant structure had to undergo much more dynamic modification than it had ever faced before. The situation demanded reorganization of functions and flexibility of understanding, not the set dogmatisms of tradition. The ancient authorities, paternal and religious, were not pliant enough. In fact, they were themselves out of place in the new context. Under these circumstances, neither the organization nor the value system brought by the folk remained unchallenged. They had to respond with a reorganization of action begun immediately as the result of getting jobs in the urban economy. Their own common values had never controlled so complex and remote an institution. The more those common values were confronted with criticism, the more tenaciously the folk affirmed them. This was their only meaningful orientation in the

new world. Here was their only source of unity, identity, and survival in the chaos of change. Naturally, this defensive orientation only served to pull them farther away from the changing symbiotic pattern by means of which their energies were most realistically engaged. To the changes induced by the urban economy, those of the secular school were added. The dichotomy between their overt practices and their covert attachments grew with unanticipated changes. Suffice it to say that this set of varying conditions made integration in the urban phase of this study a problematic one.

## SOCIOLOGY

### MORTALITY DIFFERENTIALS IN MICHIGAN

(Publication No. 1151)\*

Paul Michael Houser, Ph.D.  
Michigan State College, 1948

#### Methods and Objectives

The purpose of this study is to describe the principal mortality characteristics of Michigan's population in 1940, and to indicate the major changes which have occurred during the thirty years 1910-1940. The method employed is to relate deaths and population on a per-thousand basis. Death rates are analyzed for rural-urban residence, age, sex, race, and cause of death. Adjustments have been made for differing age distributions whenever feasible. The results have been compared with corresponding data for the Nation. Ten-year average death rates (1935-1944) by residence and cause of death are presented for each county to indicate variation within the State.

#### Findings

The urban age-adjusted death rate is higher than the rural for the white population of both sexes and for most of the leading causes of death. Rural colored people have considerably higher death rates than the corresponding urban class. Among urban residents, death rates vary inversely with the size of city, small cities (2,500-10,000) having the highest rate.

Crude death rates are generally higher in rural areas, a reflection of an older population. Rural

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age-specific rates slightly exceed the urban between ages 1-24 and for those 75 years and over. More rural infants die annually for each 1,000 live births than in urban areas, but more urban mothers succumb from childbirth.

Colored death rates exceed the white for all population segments. Since rural colored rates are excessively high, white-nonwhite mortality differentials are much greater in rural than in urban areas. These differentials are higher in urban than in rural segments of the Nation.

Males have higher death rates than females with the exception of ages 5-24 and 35-44 among colored persons. Contrasted with urban areas, rural Michigan has slightly greater mortality sex differentials, but for the Nation they are greater in urban segments.

The leading cause of death in all counties and the State is heart diseases. Cancer ranks second and apoplexy third. Only two of the ten leading causes are communicable, tuberculosis and pneumonia. The rural rate from pneumonia exceeds the urban, but tuberculosis is higher in urban areas.

Counties in the Upper Peninsula tend to have higher age-adjusted death rates than those in the Lower Peninsula. Crude rates from the principal causes, chiefly chronic diseases, are highest in the southwestern part of the State. Low rural crude rates tend to occur in predominantly urban counties and high rural rates in predominantly rural counties. Death rates from tuberculosis are high in Wayne county and in the Upper Peninsula.

Most death rates declined in all segments of Michigan's population from 1910-1940. Female death rates decreased more than male in all age groups, and in the colored population more than in the white. Of the ten principal causes of death in 1910, only heart diseases, cancer, and diabetes have

increased. Vehicle accidents, not a leading cause of death in 1910, have increased at a phenomenal rate.

Although in most instances mortality rates of the Nation decreased more than those of Michigan during the period under study, present rates are generally lower for the State than for the Nation. In the Nation as a whole, the urban crude death rates exceed the rural, but in Michigan the reverse relationship is true.

#### Sources of Data

Vital Statistics of the United States, 1940, Part II, Residence, United States Government Printing Office, Washington, D. C., 1943.

Linder, Forrest E., and Grove, Robert D., Vital Statistics Rates in the United States 1900-1940, United States Government Printing Office, Washington, D. C., 1943.

Annual Report of the Michigan Department of Health, Numbers 64-74, Michigan Department of Health, Lansing, Michigan, 1936-1945.

THE CONSTRUCTION OF A HOME ADJUSTMENT  
QUESTIONNAIRE WHICH MAY BE USED AS AN AID  
IN THE DETECTION OF SYMPTOMS OF JUVENILE  
DELINQUENCY

(Publication No. 1153)\*

Mae Belle Claytor, Ed.D.  
New York University, 1948

This study concerns the construction of a Home Adjustment Questionnaire which is designed to measure some intricate phases of parent - child relations which are associated with, and may operate in producing various evidences of delinquent behavior. The specific problems discussed in the study include the following: (1) the description and classification of some major principles which are involved in good or poor home adjustment; (2) the selection of items which appear to be appropriate for a Home Adjustment Inventory; (3) the trying-out of items, and the final determination of items which are clearly significant; (4) the administration and scoring of the Inventory; (5) the evaluation of the Questionnaire in terms of its reliability, validity, and practicality, and (6) the compilation of a Manual to be used as a guide in administering and interpreting the outcome of the Questionnaire.

The Inventory is standardized upon a population which includes 294 white, and 165 Negro children of both sexes who are eight through sixteen years of age, and in elementary-school grades four through seven. Since the Questionnaire pertains to delinquents and non-delinquents, four random samples

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were selected from each stratum. These samples had two characteristics in common, namely: age, 8-16, and grade level 4-7. All were selected from urban school systems. Three of the samples were selected in the State of Virginia, and the fourth sample consisted of children selected from Illinois, Pennsylvania, New Jersey, and Ohio.

The final Home Adjustment Questionnaire consists of Sixty-Seven Questions which are distributed among Five Sections. The topic of each section and some items typical of those having high significance are as follows:

**Section One -- Home - Membership**

1. Do you live with your own mother?	Yes	No
2. Are your parents living together?	Yes	No

**Section Two -- Father - Child Relations**

1. Do you feel that your father bosses you too much?	Yes	No
2. Do you talk back to your father?	Yes	No

**Section Three -- Mother - Child Relations**

1. Are you afraid of your mother?	Yes	No
2. Do you love your mother more than your father?	Yes	No

**Section Four -- Mother - Father - Child Relations**

1. Do your parents go out together?	Yes	No
2. Do your parents like your friends?	Yes	No

**Section Five -- Other Aspects of Home Adjustment**

1. Do you attend movies alone after 7 P.M.?	Yes	No
2. Are your friends made welcome in your home?	Yes	No

Each of the Questionnaire Sections consists of a number of Categories which are defined and described

in detail in the study. The reliability of the Questionnaire was determined by correlating the scores of the odd-numbered questions against the scores made on the even-numbered questions. The coefficient of reliability, when corrected by the Spearman-Brown Formula was found to be .90 (P.E., .01).

The initial selection of items used in the Inventory were based on (1) research studies, (2) an analysis of official and unofficial delinquents, (3) semi-refined observations. The basic test of validity was determined by the items which clearly differentiated between the delinquent and non-delinquent groups, (these groups are differentiated according to the laws of society). A critical ratio of at least 1.50 was taken as an indication of a significant difference between the two groups since there are 93 chances in a hundred that such an obtained difference is significant. The validity of the test was predicated on two additional factors, namely: (1) Correlations between Total Scores for Each Test Section and the Gross Total Inventory Scores, and (2) Bi-Serial Coefficients of Correlation which were computed between Inventory Responses and the Total Adjustment Scores.

## THEATER, FRENCH

### A STUDY OF ELISABETH RACHEL FELIX (1821-1858)

(Publication No. 1110)\*

Arthur Klein, Ph.D.  
University of Michigan, 1948

Born in an obscure Swiss village of poor Jewish peddlers, Rachel spent a wretched and uneducated childhood wandering with her parents from town to town earning a few coppers by singing in the streets. She was noticed by a choral master who realized her talents were better served through theatre and passed her on to Saint-Aulaire who gave her the opportunity to develop her sense of characterization by allowing her to play in many different roles. She was seen by Samson, a professor at the Conservatoire and soon after became his pupil and was admitted to the Comedie-Francaise where she made her debut in 1838. It was Samson who gave talent to Rachel's genius by inculcating in her the principles of naturalness and simplicity according to the tradition bequeathed by Talma. His own classical knowledge directed the instinctive tastes she possessed for the great tragedies of the Grand Century and it was he who illuminated and elevated her mind, who indicated the temper of the characters with a lucidity which permitted her intuitive intelligence to enter completely into the conception of the role. The richness of Rachel's personality as well as the richness of her voice allowed her to create characterizations of contrasting physiognomy as well as contrasting style. And following Samson's precepts she admitted neither dishevelled action nor the tearful spasmodic declamation

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of the actors of "drame," nor on the other hand did she follow the traditional singsong and bombast of the classical actors. Giving up the excesses of old and new schools she was able to develop to a still greater degree the new freedom of expression and apply a new phrasing to Racine's and Corneille's tragedies, yet with the moderation her genius felt imposed by the text of these playwrights. She broke the classical recitative and made the alexandrine more supple. She never said the lines prosodically or melodically. She always recited them according to the sense and not according to the measure, caring more for the speech than for the music. It is Rachel's controlled lucidity which made her better able to express the disciplined art of the classics than the emotional one of the "drame." The same intellectual intensity made her less attuned to expressing pure sensitive emotion than the violent passions of the mind: anger, irony, sarcasm, violent despair, pride, scorn, and fury.

This STUDY analyses the characterizations of her repertoire and the critical reception they received. It discloses her artistic and personal relationships with the entire world of theatre, society, and of art, the members of her family and the audiences of all the countries in which she toured. Amplified by unpublished material it so brings a synthesized portrait of Rachel as an artist and woman to which the translation of a diary by J. Jules Chery, a member of her American touring company, discovered in the Archives de la Bibliotheque de la Comedie-Francaise adds the living touch of a sympathetic portrayal.

The STUDY finally shows how in spite of genius and miraculous chance the excesses of self-assertion and avidity for living and acquiring led to disaster and early death.

ZOOLOGY

A CONTRIBUTION TO THE LIFE-HISTORY OF THE  
DEER LUNGWORM LEPTOSTRONGYLUS ALPENAE  
(NEMATODA: METASTRONGYLIDAE), WITH  
OBSERVATIONS ON ITS INCIDENCE AND BIOLOGY

(Publication No. 1094)\*

E. Leonard Cheatum, Ph.D.  
University of Michigan, 1948

The results of a study on the life-history of Leptostrongylus alpenae (Dickmans, 1935) Dougherty and Goble, 1946 are presented with observations on incidence of this parasite in white-tailed deer in New York state. The probability that the common deer lungworm in Michigan is L. alpenae rather than Prostostrongylus coburni as reported by other authors, is indicated. A discussion of some ecological factors affecting natural transmission is included.

Experimental infections with L. alpenae were induced in nine species of pulmonate gastropods. A description of morphology in all stages of development in the intermediate host is presented. The third and infective stage is reached in Succinea retusa, Polygyra albolabris and Discus cronkhitei in from 28 to 35 days. In Succinea ovalis, Polygyra hirsuta, P. tridentata, Zonitoides arboreus and Anguispira alternata development is slower; Helicodiscus parallelus, Cochlicopa lubrica and Agriolimax agrestis proved unsatisfactory as intermediate hosts.

Snails containing infective larvae were fed to eight captive deer. The prepatent period varied from 67 to 108 days. Approximately three months is considered to be the average prepatent period. Invading

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larvae were found as emboli in the lungs and are described. No adults were recovered in the feeding experiments.

The identity of the larval forms of the parasite is based upon the following evidence: 1. Identity of structural characteristics with larvae which were hatched from eggs deposited by a specimen of L. alpenae recovered from the lungs of a wild deer; 2. Continued structural identity throughout development in the intermediate host; 3. Identity of developmental periods in the intermediate host.

Repeated administrations of infective larvae to one experimental deer were followed by production of nodular lesions in which intense eosinophilia prevailed. This is regarded as an immune reaction provoked by the super-infections.

An analysis of incidence of L. alpenae and species of Dictyocaulus in 709 deer from various regions of the state is presented. Seventy-three (73%) per cent of the Adirondack deer were infected with L. alpenae and 21.6 per cent with species of Dictyocaulus. The incidence of L. alpenae and Dictyocaulus in deer from the remainder of the state was 27.3 and 3.9 per cent respectively. Fawns were more frequently infected in the Adirondacks than were adults, whereas (in the case of L. alpenae) adults were more frequently infected in the remainder of the state. A seasonal variation in the incidence of L. alpenae infections was observed. Deer collected in early spring presented the highest incidence.

The factor of acquired, temporary immunity is presented as a basis for explaining the variations of incidence in different age classes of deer. Climatic and habitat characteristics of the Adirondack region, and the wintering habits of deer in this area, are discussed as important factors which increase the incidence of lungworm infections in this region. The high incidence of infection in the spring is correlated with the fall and winter feeding habits of deer.

## CYTOLOGICAL STUDIES ON THE OÖGENESIS OF CERTAIN INDIAN AND AMERICAN SNAKES

(Publication No. 1109)\*

Brahma Swarup Kaushiva, Ph.D.  
University of Michigan, 1949

This investigation, which pertains to four species of snakes, three Indian and one American, deals with the extensive cytological changes in the oöcyte during oögenesis under three headings: (1) Structure of the ovary, (2) Nucleolus, and (3) Golgi apparatus.

(1) Structure of the ovary. The ophidian ovary possesses an internal cavity, the ovocoel, into which extend the growing oöcytes. The outer surface of the ovary is composed of a germinal epithelium, consisting of oögonia or oöcytes and epithelial cells. Early oöcytes may be distinguished by the possession of a prominent spireme within the nucleus during the prophase stages. The oöcyte in early stages of growth is without a follicle. Later, the presumptive follicular cells of the germinal epithelium arrange themselves around the oöcyte to initiate formation of the follicle. The entire sequence in the development of the follicle is traced. In a fully mature egg, the follicle consists of a zona radiata, three layers of follicle cells, and a theca folliculi. The follicle plays an important part in the growth of the oöcyte by providing required nutritive materials. After ovulation, the follicle is transformed into a new structure, the corpus luteum. Its function was not determined.

(2) Nucleolus. In the oöcytes two kinds of

\* Microfilm copy of complete manuscript of 130 pages, \$1.63. Enlargements 6" x 8", 10¢ per page. Library of Congress Card Number Mic A 48-318.

nucleoli are present: plasmosomes and karyosomes. The plasmosomes are non-chromatinic and give a negative Feulgen reaction. The karyosomes, on the other hand, possess chromatin material. Methods were not employed which demonstrate the true chemical nature of the nucleolus. The plasmosome undergoes active changes in form, size and staining capacity during oogenesis. It occurs in early oocytes as a single rounded body within the nucleus. On reaching a certain size it begins to fragment and forms several smaller bodies. These bodies arrange themselves near the nuclear membrane and are eventually extruded into the cytoplasm of the oocyte. Likewise karyosomes are extruded, but less frequently. Follicular nuclei and cells are also emitted into the ooplasm and thus serve as a second source of chromatin material.

It is suggested that the extruded plasmosomes provide the agency by which rubonucleic acid from the nucleus is laid down into the egg cytoplasm. This conclusion is supported by the observations of Caspersson and Schultz (1940), Brachet (1940) and Painter (1945). The functional significance of the extruded karyosomes is problematical and no suggestion of their role in the cell metabolism is offered here.

(3) Golgi apparatus. Golgi bodies were examined both in fixed material and fresh preparations. They were seen as simple granular or spherical bodies and never showed a duplex structure. Their entire cycle of activity was followed. The Golgi bodies from the follicular epithelium infiltrate into the ooplasm where they mix freely with those of the oocyte. A thick peripheral concentration of the Golgi elements of double origin is thus formed. The Golgi granules aggregate and form fatty yolk by direct transformation. The formation of fatty yolk may occur in any part of the oocyte. It has been observed in the peripheral region in Eryx conicus and Thamnophis ordinatus ordinatus, at one end of the oocyte in Natrix piscator piscator, and in the "yolk nucleus area" in Lycodon aulicus aulicus.

THE PHYSIOLOGY OF WILD GALLINACEOUS BIRDS  
IN RELATION TO THE ENVIRONMENT

(Publication No. 1111)\*

William Henry Long, Sc. D.  
University of Michigan, 1948

This dissertation reports the results of researches conducted from 1929 to 1942 in the physical ecology, and the physiology, nutrition, and adaptations of wild birds, both in the natural habitat and under controlled conditions. The literature is thoroughly reviewed, and the results of original observations and experiments are presented covering the most pertinent information now available on physiological effects of environmental factors upon the ring-necked pheasant, bobwhite quail, Hungarian partridge, wild turkey, and ruffed grouse of both sexes in different age classes. The studies were undertaken to determine the internal and external reactions to environmental factors which (a) influence distribution, abundance, activity, and duration of life, (b) contribute to the development and maintenance of homoiothermism, and (c) govern the physiological regulation of body heat and the exchange of energy between the body and the environment. The effects of exposure to extreme heat or cold and immersion in water were studied, and the efficacy of various methods of rewarming individual birds of different ages suffering from cold were tested. In addition other factors were studied sometimes separately and sometimes in combination with temperature. The effects of ingestion of food, muscular activity, inanition, injection of glycogen or sodium

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amytal; exposure to light and darkness, natural precipitation, and immersion in water were all studied. The reactions of the birds were observed directly and the physiological changes that lie behind the externally evident reactions were carefully measured by use of appropriate apparatus. Variations in surface and internal temperature, heart and respiration rates, body weight, and the rate of respiratory exchange were used as indicators of physiological reactions in the various experiments. The design, construction, and use of apparatus employed is described. These are open- and closed-circuit respiration apparatus; respiration chambers; electric thermocouples used for recording temperature of skin, plumage, internal organs and body cavities; apparatus for measuring thermal conductivity of skin, movements of organs of digestion, and muscular activity.

Conclusions drawn from these experiments are of both practical and scientific value in wildlife conservation and, in human physiology and climatology. Healthy wild gallinaceous birds of normal weight and complete plumage automatically increase their metabolic rate upon exposure to cold and have a thermo-regulatory mechanism superior to that of many other animals. Both physiological and environmental variables must be considered together in defining the optimum conditions compatible with life and limits of tolerance to environmental factors. The effect upon body temperature regulation of sudden changes in external temperature is a function of time, depending upon the rapidity, intensity, and duration of the change, and upon the ability of the bird to adjust chemical, thermal, nervous, physical, and nutritive attributes rapidly enough to compensate for marked changes in the environment. Physiological adaptation to environmental temperature depends largely upon the temperature previously experienced. Good plumage, in combination with the specific dynamic effect of the food ingested, serves as an effective mechanism in body temperature regulation and therefore, together, constitute a major factor in survival.

## THE NITROGENOUS METABOLISM OF THE EARTHWORM

(Publication No. 1137)\*

Stanley Cohen, Ph. D.  
University of Michigan, 1949

A study was made of the nitrogenous excretory products of well-nourished and starved earthworms (*Lumbricus terrestris*). Well-nourished worms excreted ammonia mainly, with traces only of urea, uric acid, allantoin, and allantoic acid. The formation of urea was increased markedly upon prolonged inanition.

A technic was devised for the quantitative oral administration of 0.1 ml. portions of a fluid to earthworms. Of the amino acids thus administered, only arginine, and, to a much smaller extent, citrulline, increased the excretion of urea. The administration of citrulline simultaneously with other amino acids (glycine, alanine, or glutamic acid) resulted in an excretion of urea which was greater than the sum of the amounts of urea produced when these compounds were ingested singly. The ingestion of ornithine, either alone or together with other amino acids, did not effect a synthesis of urea.

In vitro studies with homogenized preparations of earthworm tissue showed that the enzyme arginase was present, localized in the intestine. It was activated by  $Co^{++}$  and had an optimal pH on the alkaline side of neutrality.

Associated with the increased excretion of urea during inanition was an increase in the urea content

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of the earthworm. In addition, the arginase activity of the starved animals (expressed in terms of either tissue N or body weight) was considerably augmented. Moreover, it was noted that whereas intact tissue preparations from starved worms showed appreciable activity, similar preparations from unstarved worms showed negligible activity.

Under conditions where neither homogenates nor intact tissue preparations from earthworms were able to synthesize urea from citrulline or ornithine, tissue preparations from the liver of the rat were capable of effecting a formation of urea.



**PART II**

**CUMULATIVE INDEX**

1. 丁酉年  
2. 1984年

## CUMULATIVE INDEX OF TITLES

Listed below are the titles of all doctoral dissertations available on microfilm, excepting those abstracted in this booklet, which have been published since the appearance of Volume VI, No. 2 of MICROFILM ABSTRACTS (Dec. 1947). Abstracts of the following dissertations have been published in MICROFILM ABSTRACTS and in special volumes prepared for Pennsylvania State College and Colorado State College of Education. All may be identified by the letters and date following the reference.

(M.A. ...) Microfilm Abstracts, University Microfilm, Ann Arbor, Michigan.

(P.S. ...) Abstracts of Doctoral Dissertations. Pennsylvania State College, State College, Pennsylvania.

(C.S. ...) Abstracts of Field Studies for Degree of Doctor of Education, Colorado State College of Education, Greeley, Colorado.

Positive microfilm copies of the complete manuscript of any of these titles may be had at 1-1/4¢ per page, or paper enlargements, 8-1/2 x 11 inches accommodating two pages each, at 10¢ per page, from University Microfilms, Ann Arbor, Michigan. Order should be made by "Publication Number," and Title.

## AGRICULTURAL AND BIOLOGICAL CHEMISTRY

An evaluation of some methods used in determining the thiamine content of meat and meat products. Oliver B. Fardig, Ph.D. Thesis; Pennsylvania State College, 1947. pp. 113, Pub. 1009. (P.S. 1947, Vol. X)

**AGRICULTURAL AND BIOLOGICAL CHEMISTRY**

Preparation, purification and refractive index determinations of the methyl, propyl and isopropyl esters of some saturated fatty acids. George William Hunter, Ph.D. Thesis; Pennsylvania State, 1946. pp. 94, Pub. 915. (P.S. 1946, Vol. IX)

The relation of molecular size and chemical constitution of saturated petroleum fractions to their insecticidal efficiency George W. Pearce, Ph.D. Thesis; Pennsylvania State, 1946. pp. 140, Pub. 899. (P.S. 1946, Vol. IX)

The effect of certain micronutrient elements on the growth and yield of pineapple plants. Francisco J. Ramirez-Silva, Ph.D. Thesis; Pennsylvania State, 1946. pp. 76, Pub. 900. (P.S. 1946, Vol. IX)

**AGRICULTURAL CHEMISTRY**

The changes of ash and nitrogen in the germinating Mung bean. Tsing Lai Lau, Ph.D. Thesis; University of Missouri, 1936. pp. 99, Pub. 927. (M.A. 1948, Vol. VIII, No. 1)

Response of slash pine (pinus caribaea morelet) to various nutrients in Norfolk soils in Florida. Rutherford Henry Westveld, Ph.D. Thesis; Michigan State College, 1946. pp. 255, Pub. 997. (M.A. 1948, Vol. VIII, No. 2)

**AGRICULTURAL EDUCATION**

Criteria for evaluating area programs of supervision in vocational education in agriculture. Biron Ertel Decker, Ed.D. Thesis; Pennsylvania State, 1947. pp. 285, Pub. 1007. (P.S. 1947, Vol. X)

**AGRONOMY**

A study of the factors affecting the structure, permeability and erodibility of soils. Russell B. Alderfer, Ph.D. Thesis; Pennsylvania State, 1947. pp. 193, Pub. 1001. (P.S. 1947, Vol. X)

**ANATOMY**

A study of the anuran diencephalon. José Guillermo Frontera, Ph.D. Thesis; University of Michigan, 1948. pp. 104, Pub. 1048. (M.A. 1948, Vol. VIII, No. 2)

**ANATOMY**

The developmental basis for the continuity of the fascial planes of the abdomen and pelvis. Mark Allan Hayes, M.D., Ph.D. Thesis; University of Michigan, 1948. pp. 229, Pub. 1056. (M.A. 1948, Vol. VIII, No. 2)

The anatomical basis for certain reflex and automatic eye movements. John Woodworth Henderson, M.D., Ph.D. Thesis; University of Michigan, 1948. pp. 64, Pub. 1057. (M.A. Vol. VIII, No. 2)

**ANIMAL HUSBANDRY**

The genetic history of the Arabian horse in America. Amin S. Zaher, Ph.D. Thesis; Michigan State College, 1948. pp. 64, Pub. 998. (M.A. 1948, Vol. VIII, No. 2)

**ANIMAL NUTRITION**

Factors involved in the superior energy utilization of high fat diets: I. voluntary activity II. dietary protein. Cyrus Edwin French, Ph.D. Thesis; Pennsylvania State, 1947. pp. 100, Pub. 1010. (P.S. 1947, Vol. X)

**ANIMAL PATHOLOGY**

Studies on the etiology of specific infectious bovine pyelonephritis. Ernest Star Feenstra, Ph.D. Thesis; Michigan State College, 1947. pp. 108, Pub. 922. (M.A. 1948, Vol. VIII, No. 1)

**ART**

Later Corinthian pottery. Mary Thorne Campbell, Ph.D. Thesis; Bryn Mawr College, 1941. pp. 234, Pub. 797. (M.A. 1946, Vol. VII, No. 1)

Ionic chiton-clad maidens of the fifth century. Cleta Olmstead Robbins, Ph.D. Thesis; Bryn Mawr College, 1942. pp. 239, Pub. 835. (M.A. 1947, Vol. VII, No. 2)

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Architectural terracottas in the Greek archaic period. Alva Doris Elford, Ph.D. Thesis; Bryn Mawr College, 1942. pp. 276, Pub. 1086. (M.A. 1948, Vol. VIII, No. 2)

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Studies of the effects of oxygen on multiplication and metabolism of Brucella. Ruth Evelyn Sanders, Ph.D. Thesis; Michigan State College, 1947. pp. 33, Pub. 932. (M.A. 1948, Vol. VIII, No. 1)

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The hydrolysis of casein by enzymes with especial reference to the distribution of amino acids in the hydrolysate.

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John Beck, Ph.D. Thesis; Purdue University, 1937. pp. 98, Pub. 859. (M.A. 1947, Vol. VII, No. 2)

A study of the fat composition and firmness of pork under various dietary conditions. Winfred Quentin Braun, Ph.D. Thesis; Purdue University, 1942. pp. 55, Pub. 849. (M.A. 1947, Vol. VII, No. 2)

Metabolism of creatine. Alice Watson Kramer, Ph.D. Thesis; Purdue University, 1935. pp. 44, Pub. 853. (M.A. 1947, Vol. VII, No. 2)

The formation of glycogen in the liver of the white rat following the administration of certain synthetic organic acids. Mary Louise Lyons, Ph.D. Thesis; Purdue University, 1941. pp. 83, Pub. 863. (M.A. 1947, Vol. VII, No. 2)

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The influence of certain dietary factors on the production of dental caries in a susceptible strain of rats. Kenneth Jean Olson, Ph.D. Thesis; Michigan State College, 1947. pp. 51, Pub. 916. (M.A. 1947, Vol. VII, No. 2)

Observations on the pathology of nutritionally induced muscular dystrophy in the guinea pig. Abdullah Mahir Pamukcu, Ph.D. Thesis; Michigan State College, 1948. pp. 123, Pub. 993. (M.A. 1948, Vol. VIII, No. 2)

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Catabolism of fatty acids. John T. Tripp, Ph.D. Thesis; Purdue University, 1936. pp. 52, Pub. 844. (M.A. 1947, Vol. VII, No. 2)

The availability to the rat of certain carotenes in raw and cooked vegetables. Marion A. Wharton, Ph.D. Thesis; Michigan State College, 1947. pp. 59, Pub. 888. (M.A. 1947, Vol. VII, No. 2)

The synthesis and intermediary metabolism of some sulfur analogues of cystine: Isocysteine. William J. Wingo, Ph.D. Thesis; University of Michigan, 1946. pp. 121, Pub. 813. (M.A. 1946, Vol. VII, No. 1)

A study of the factors influencing the release of lead from the tissues of the mouse. Grant Saunders Winn, Ph.D. Thesis; Purdue University, 1940. pp. 130, Pub. 854. (M.A. 1947, Vol. VII, No. 2)

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Factors affecting the respiration of isolated tissue. Carl McGee Meadows, Ph.D. Thesis; Purdue University, 1941. pp. 74, Pub. 861. (M.A. 1947, Vol. VII, No. 2)

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Effect of nutrition on the reaction of cereals to leaf rust. Kenneth Davis Doak, Ph.D. Thesis; Purdue University, 1931. pp. 195, Pub. 843. (M.A. 1947, Vol. VII, No. 2)

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Antiseptic chemicals to inhibit the growth of microorganisms in nutrient solution cultures containing soluble carbohydrates. Thomas Matthew Eastwood, Ph.D. Thesis; Purdue University, 1948. pp. 139, Pub. 946. (M.A. 1948, Vol. VIII, No. 1)

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Terminal elongation of a number of tree species in relation to certain environmental conditions in northern New York.

C. Eugene Farnsworth, Ph.D. Thesis; University of Michigan, 1945. pp. 240, Pub. 921. (M.A. 1948, Vol. VIII, No. 1)

A phytogeographic study of Alaskan mosses. Alton McCaleb Harvill, Jr., Ph.D. Thesis; University of Michigan, 1948. pp. 351, Pub. 1055. (M.A. 1948, Vol. VIII, No. 2)

Eragrostis in north and middle America. LeRoy Hatfield Harvey, Ph.D. Thesis; University of Michigan, 1948. pp. 304, Pub. 967. (M.A. 1948, Vol. VIII, No. 1)

"White-heads" of grasses. Harry Louis Keil, Ph.D. Thesis; Pennsylvania State, 1946. pp. 39, Pub. 895. (P.S. 1946, Vol. IX)

The action of allelic forms of the gene  $A_1$  in maize. John R. Laughman, Ph.D. Thesis; University of Missouri, 1946. pp. 113, Pub. 809. (M.A. 1946, Vol. VII, No. 1)

The associations of bark-inhabiting bryophytes in Michigan. Edwin Allen Phillips, Ph.D. Thesis; University of Michigan, 1948. pp. 128, Pub. 1070. (M.A. 1948, Vol. VIII, No. 2)

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Mineral absorption and resistance to wildfire in tobacco. Paul Sacco, Ph.D. Thesis, Pennsylvania State, 1946. pp. 105, Pub. 901. (P.S. 1946, Vol. IX)

An experimental study of colletotrichum graminicolum on fine turf. Emily T. Wolff, Ph.D. Thesis; Pennsylvania State, 1947. pp. 82, Pub. 1038. (P.S. 1947, Vol. X)

## CERAMICS

A systematic study of the effect of oxide constituents on the viscosity of silicate glasses. James Purvis Poole, Ph.D. Thesis; Pennsylvania State, 1947. pp. 137, Pub. 1026. (P.S. 1947, Vol. X)

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**CHEMICAL ENGINEERING**

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The application of physical chemical methods to selective solvent extraction. George Herbert Cummings, Ph.D. Thesis; Pennsylvania State, 1941. pp. 284, Pub. 1005. (P.S. 1947, Vol. X)

The hydrogenation of coal at high temperatures. Robert Eugene Howard, Ph.D. Thesis; Purdue University, 1942. pp. 103, Pub. 985. (M.A. 1948, Vol. VIII, No. 2)

The continuous superfractionation of hydrocarbon mixtures. Norman Kirk, Ph.D. Thesis; Pennsylvania State, 1946. pp. 197, Pub. 1019. (P.S. 1947, Vol. X)

The composition and utilization of several typical hydrocarbon naphthas. Stephen Lawroski, Ph.D. Thesis; Pennsylvania State, 1943. pp. 127, Pub. 1020. (P.S. 1947, Vol. X)

A. The effect of composition on the oxidation of hydrocarbon oils. B. The catalytic oxidation of Pennsylvania neutral oils. Neal Devere Lawson, Ph.D. Thesis; Pennsylvania State, 1946. pp. 198, Pub. 896. (P.S. 1946, Vol. IX)

Some calculations of multicomponent separations. Harold S. Ray, Ph.D. Thesis; Pennsylvania State, 1946. pp. 436, Pub. 903. (P.S. 1946, Vol. IX)

The separation of close-boiling hydrocarbon mixtures by distillation methods. Albert Eugene Schubert, Ph.D. Thesis; Pennsylvania State, 1941. pp. 147, Pub. 1032. (P.S. 1947, Vol. X)

The performance of solvent extraction equipment. Bruce Robert Tagge, Ph.D. Thesis; Pennsylvania State, 1942. pp. 204, Pub. 1036. (P.S. 1947, Vol. X)

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A study of some organic carbonate esters and related compounds. Neil Warner Berst, Ph.D. Thesis; Pennsylvania State, 1947. pp. 165, Pub. 1003. (P.S. 1947, Vol. X)

I. Organofluorosilanes. II. Experiments in fluorocarbon chemistry. Thomas Jacob Brice, Ph.D. Thesis; Pennsylvania State, 1946. pp. 89, Pub. 913. (P.S. 1946, Vol. IX)

The determination of calcium as oxalate by the use of urea and formic-formate buffer. Frank S. Chan, Sc.D. Thesis; University of Michigan, 1933. pp. 153, Pub. 799. (M.A. 1946, Vol. VII, No. 1)

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Preparation and properties of wetting agents from kerosene. Duncan James Crowley, Ph.D. Thesis; Purdue University, 1940. pp. 134, Pub. 866. (M.A. 1947, Vol. VII, No. 2)

Nitration of the higher alkanes. Mortimer Cooper Denison, Ph.D. Thesis; Purdue University, 1940. pp. 53, Pub. 984. (M.A. 1948, Vol. VIII, No. 2)

The reaction of typical aliphatic Grignard reagents with some unsaturated aldehydes and ketones. Joseph Ardiff Dixon, Ph.D. Thesis; Pennsylvania State, 1947. pp. 103, Pub. 1008. (P.S. 1947, Vol. X)

I. The heat capacity and entropy, heats of fusion and vaporization and the vapor pressures of butene-1. The zero point entropy of the glass. The entropy of the gas from molecular data. II. The heat capacity and entropy, heats of transition, fusion and vaporization and the vapor pressures. Evidence for a non-planar structure of cyclopentane.

III. Equilibrium in the system oxygen-nitrogen-argon.

Herman L. Fink, Ph.D. Thesis; Pennsylvania State, 1945. pp. 96, Pub. 892. (P.S. 1946, Vol. IX)

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I. The effect of cyclization on physical properties of C<sub>14</sub> hydrocarbons. II. The entropy of 11-n-decylheneicosane. III. A constant heat conduction melting point calorimeter. Fred B. Fischl, Ph.D. Thesis; Pennsylvania State, 1946. pp. 187, Pub. 911. (P.S. 1946, Vol. IX)

Preparation and reactions of certain cyclic ketones. George Iwao Fujimoto, Ph.D. Thesis; University of Michigan, 1948. pp. 80, Pub. 952. (M.A. 1948, Vol. VIII, No. 1)

The pyrolysis of sodium salts of alpha-substituted acids. Duane L. Green, Ph.D. Thesis; Pennsylvania State, 1945. pp. 111, Pub. 779. (P.S. 1945, Vol. VIII)

I. Polymerization of tetramethylethylene. II. The vapor phase catalytic isomerization of dimethylaniline. III. The use of active carbon in the recovery of penicillin. Homer Huston Haggard, Ph.D. Thesis; Pennsylvania State, 1946. pp. 164, Pub. 912. (P.S. 1946, Vol. IX)

The precipitation and determination of zirconium by hydrolysis of metaphosphoric acid and organic phosphates. Richard Balser Hahn, Ph.D. Thesis; University of Michigan, 1948. pp. 95, Pub. 964. (M.A. 1948, Vol. VIII, No. 1)

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A kinetic study of the uncatalyzed alkylation of phenol. Harold Hart, Ph.D. Thesis; Pennsylvania State, 1947. pp. 78, Pub. 1012. (P.S. 1947, Vol. X)

Phase diagrams for various selective solvents; solubility studies using liquid ammonia. Robert B. Healy, Ph.D. Thesis; Pennsylvania State, 1944. pp. 338, Pub. 1014. (P.S. 1947, Vol. X)

I. The synthesis and properties of higher hydrocarbons. II. Solvent extraction of penicillin. III. The Wolff-Kishner reaction at atmospheric pressure. IV. Miscellaneous studies. Clarence Harold Herr, Ph.D. Thesis; Pennsylvania State, 1947. pp. 297, Pub. 1015. (P.S. 1947, Vol. X)

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